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World's Largest Apple User Group Magazine

August 1986 • $3.00 U.S.

Simulating a Simulation Language

INSIDE:

- Computer Modeling: An Introduction
- Getting AppleWorks and THE Spreadsheet to Behave
- Using 3.5" Disks as DOS 3.3 Backups
- Creating Inverse Bar Menus

PLUS:

- Silicon Intelligence
- DOS Enhancements

- Technical Tips, New Products, and much more. . .

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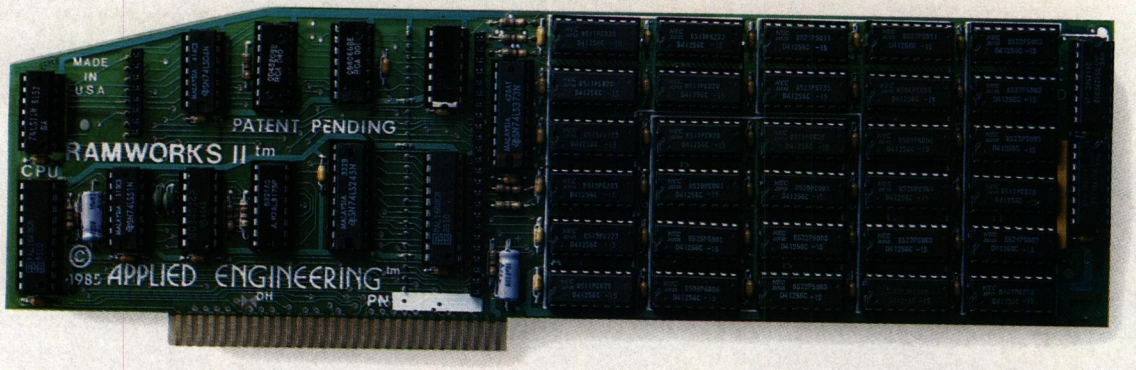
Apple PugetSound Program Library Exchange

RamWorks II®

The Best Selling, Most Compatible, Most Recommended, Most Expandable Card Available.



64K to 16 MEG! RamWorks II Is Number One.

It's simple, RamWorks II sells the most because it does the most.

The AppleWorks Amplifier.

While RamWorks II is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks II does. Naturally, you'd expect RamWorks II to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K, and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks II does. With a 256K or larger RamWorks II, *all* of AppleWorks (including printer routines) will automatically load itself into RAM dramatically increasing speed by eliminating the time required to access the program disk drive. Switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

Only RamWorks II eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 15,000. *Only* RamWorks II increases the number of lines permitted in the word processing mode from 2,250 to over 15,000. And *only* RamWorks II (256K or larger) offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to AppleWorks. RamWorks II even expands the clipboard. And auto segments large files so they can be saved on two or more disks.

RamWorks II, nothing comes close to enhancing AppleWorks so much.

The Most Friendly, Most Compatible Card Available.

Using RamWorks II couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, The Spread Sheet, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and *all* hardware add on's like ProFile and Sider hard disks). RamWorks II is even compatible with software written for Apple cards. But unlike other cards, RamWorks II plugs into the IIe auxiliary slot providing our super sharp 80 column text in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

Highest Memory Expansion.

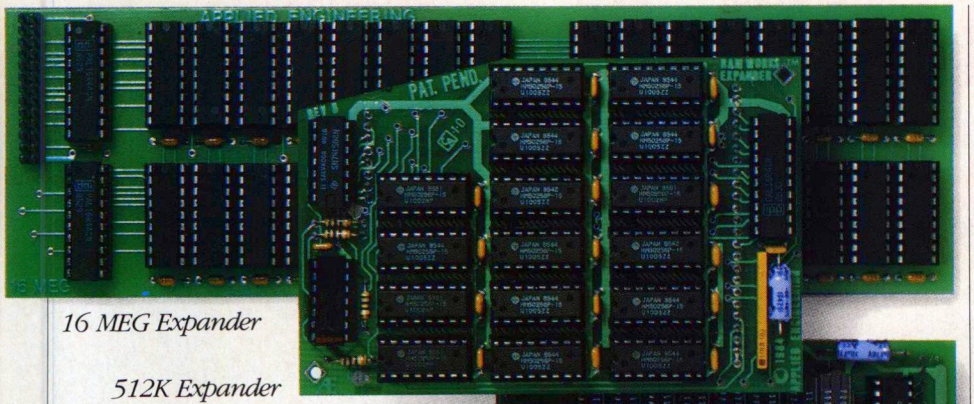
Applied Engineering has always offered the largest memory for the IIe and RamWorks II continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more than 1 MEG, RamWorks II has the widest selection of expander cards available. Additional 512K, 2 MEG, or 16 MEG cards just snap directly onto RamWorks II by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for over 20 years.

It Even Corrects Mistakes.

If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks II, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks II to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks II and with good reason. Some others combine RGB output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks II RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only $129 it can be added to RamWorks II, giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks II RGB option is more than just the ultimate in color output because unlike others, it's fully



16 MEG Expander

512K Expander

compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks II RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and remember you can order the RGB option with your RamWorks II or add it on at a later date.

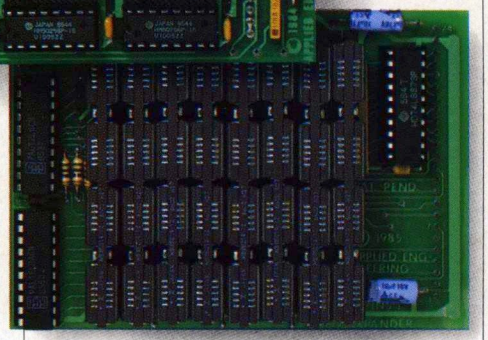
True 65C816 16 Bit Power.

RamWorks II has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

Endorsed by the Experts.

Steve Wozniak, creator of the Apple Computer said "I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks." A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks II is king of the hill."

Apple experts everywhere are impressed by RamWorks II's expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks II in your Apple, you'll make IBM PC's and AT's look like slowpokes.



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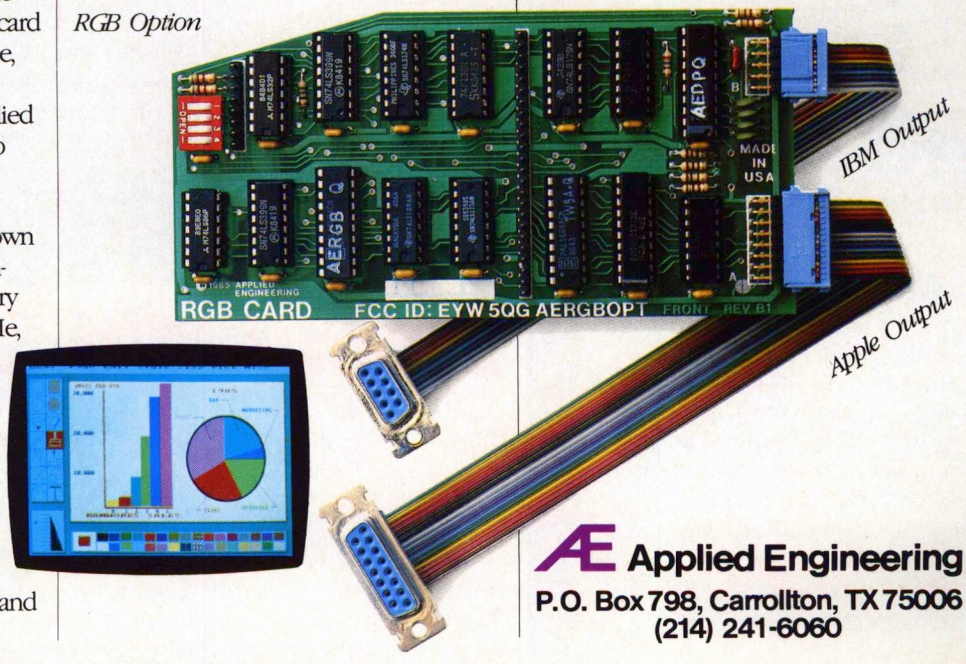
- Automatic AppleWorks expansion up to 3017K desktop
- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- The only large RAM card that's 100% compatible with all IIe software

RGB Option



- RamDrive™ the ultimate disk emulation software included free
- Memory is easily partitioned allowing many programs to be in memory at once
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- Takes only one slot (auxiliary) even when fully expanded
- Software industry standard
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- Used by Apple Computer, Steve Wozniak and virtually all software companies
- Displays date and time on the AppleWorks screen with any PRO-DOS compatible clock
- Much, much more!

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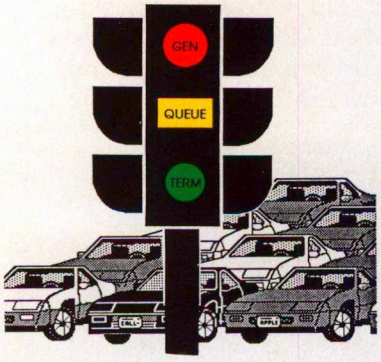

About the Cover

In the world of the future, when nearly *everything* can be simulated by computer, will we lose sight of reality? Illustration by Mary Hubert.

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A.P.P.L.E. Co-op

August New Products & Specials

Cauzin Strip Reader

Softstrip
COMPUTER READABLE PRINT

Seen in the pages of Call-A.P.P.L.E., the Cauzin strip reader gives you a convenient way of copying programs from sources printing Softstrips. You can avoid the tedium of entering long programs into your computer by hand. Included is a free one year membership to the StripWare Club. Benefits include free software mailed to you monthly. "Stripper" is also included free with the Apple II version ($19.95 value). With this program you can create your own softstrips with an Apple Imagewriter, Epson FX or RX printer. No special hardware is required to use the reader on a //e. To print strips on a //e, you'll need a Super Serial card, Grappler, or Dumpling graphics card (or equivalents).

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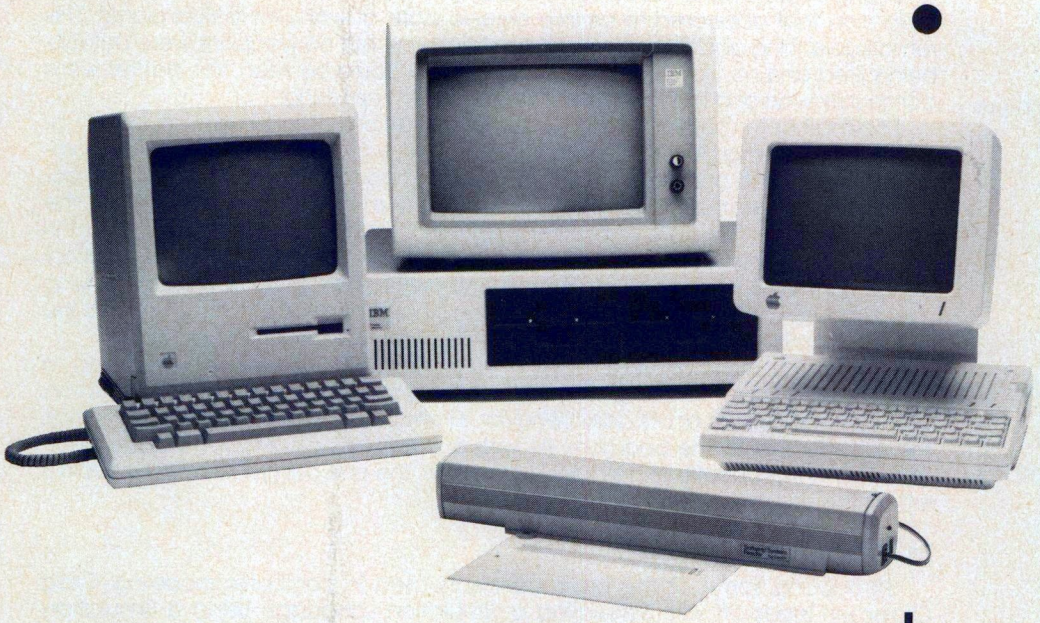
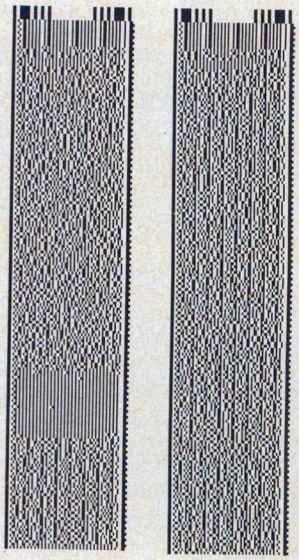
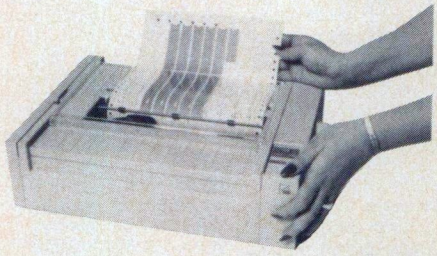




RED2BLUE.COM
Conversion Program

READTHIS.TXT
INSTRUCTIONS

ON PAPER



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THE INNER CIRCUIT

Don Elman

Computer Models

In one of Star Trek's more philosophical episodes, the Enterprise encountered a civilization that appeared to be in a chronic state of war with its rival planet. The remarkable thing about this perpetual conflict was that no weapons were actually being fired and no violent deaths or destruction could be seen. Yet, battles were continually won and lost, and the mortality count kept rising.

Looking back in history, the story goes, there had once been a real, bloody struggle, but the warring governments had come to rely more and more on their computers to simulate and project the outcomes of each encounter–taking into account the relative strengths and effectiveness of their strategies. At some point, the leaders realized that their well-refined simulations had become nearly perfect in predicting the exact amount of damage to people and property from each military action, so they agreed to stop the messy, physical engagements while continuing the computerized ones. After every electronic battle, each side simply ushered the requisite number of its own people into a quick, painless death chamber.

Even today we know that many ordinary areas of our lives are subjected to serious computer modeling, from economics to politics and transportation. Ultimately, no aspect of our daily behavior is immune, whether in the shopping mall, the school, or even the bedroom. As with any technological tool, there are enormous, potential benefits to be gained. However, the one danger we should avoid is letting the simulation *become* the reality.

In This Issue

Introducing some of the basic concepts used in computer modeling, Craig Crossman leads off with **Simulating a Simulation Language Using a Simulation**. Drawing from the specialized language GPSS, two demo programs graphically illustrate a flowchart in action as you've rarely seen it before. Next, Jeffrey Jacques shows how to extend your spreadsheet's versatility in Part 1 of **Upgrading Your Spreadsheet: Getting AppleWorks and THE Spreadsheet to Behave.**

We also have three useful articles for serious computer users: **Using 3.5" Disks to Backup DOS 3.3 Floppies** by Sean Nolan, **Smart Bar**, a program for making inverse bar menus by Ralph Knight, and **DOS Enhancer**, a wedge for simplified file handling by Wesley Weber. This month's installment of **Silicon Intelligence** by Michael and Lisa Storrie-Lombardi focuses on the fundamentals of an expert system. Adding our usual range of columns and tips to this model mixture, we hope you can keep at least one foot planted in the real world for another month.

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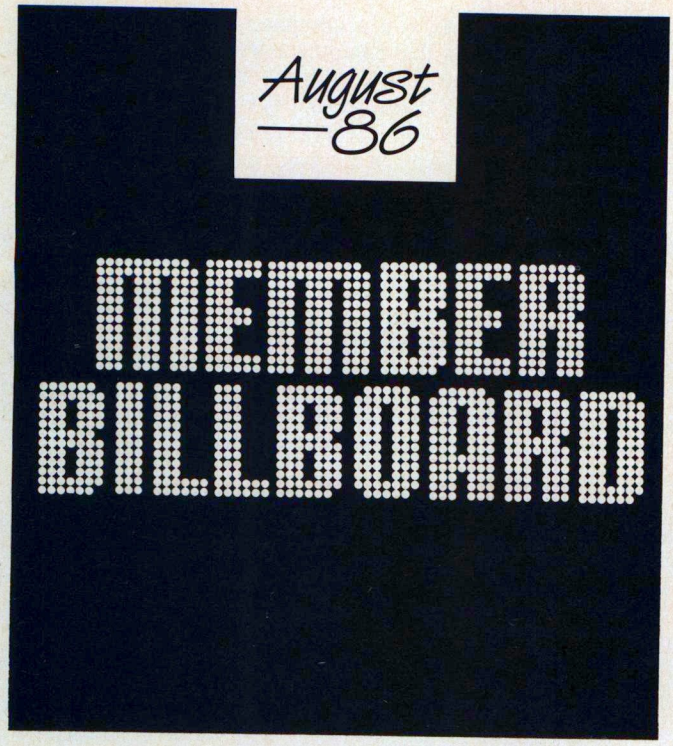

Warehouse Sale Success

Because of the overwhelming response to our May warehouse sale (sorry for the long lines--we'll try to do better), we are planning to have at least two more this year. The current schedule is September 13th and December 6th, but watch for more details in your local announcement flyers.

Dividends Are In the Mail

Dividend notices were mailed to all eligible Co-op members during July. To be eligible, you must be an active member as of May 1, 1986, and have purchased products from A.P.P.L.E. Co-op during the previous 12 months. Of course, no credit can be given for products that were returned, and the amount of your dividend will be reduced by any outstanding balances still owed to the Co-op.

If you have not received your notification by August 15th, 1986, please write to our Member Services department with the following information: name, address, phone number, membership number, expiration date, and social security number. If possible, please include the dates, order numbers, and dollar amounts of your eligible purchases.

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The financial transaction and account status are summarized in the lower right corner. *If the full order has been shipped* and the bottom line ("NEW ACCOUNT BALANCE") is zero, then everything is done. A negative account balance means you owe more, and a positive balance means you have a credit toward future purchases. In general, our policy does not allow cash refunds. Incidentally, *payments must be in U.S. funds only,* unless special advance arrangements have been made. Additional details about payments will often appear below your name and address near the middle-left area of the invoice.

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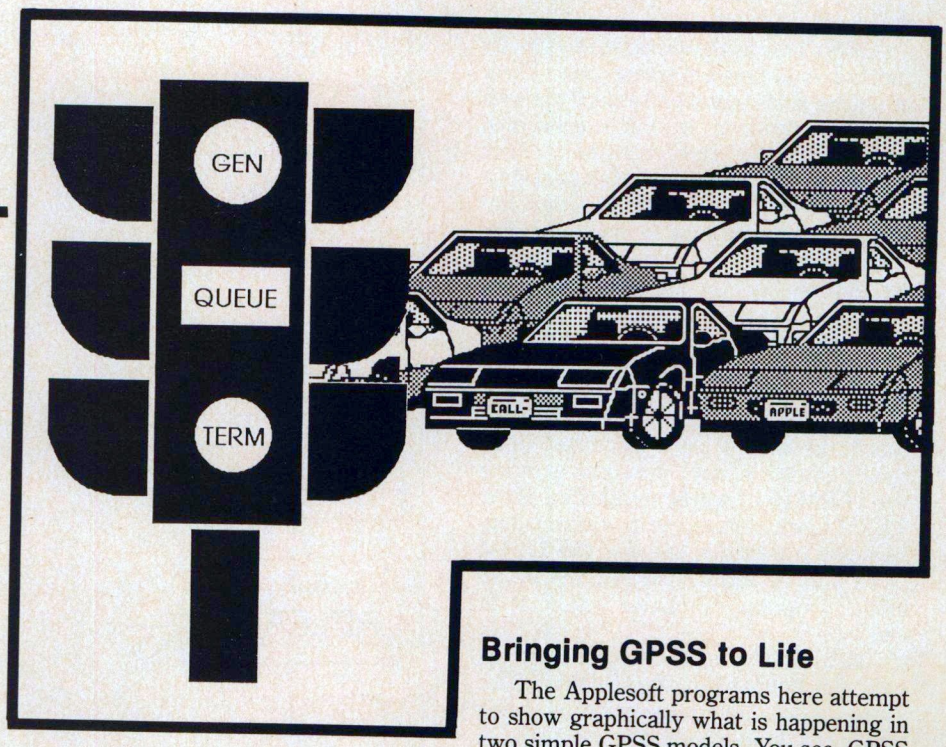
Finally, please remember to identify yourself by membership or customer number in all correspondence and phone inquiries.

Another Winning Reader

Congratulations to Fred Hirschler of West Vancouver, British Columbia, whose Reader's Choice card was drawn at our monthly meeting for a $100 credit toward Co-op products. We're pleased to acknowledge the support of our many Canadian and other foreign members.

Simulating a Simulation Language Using a Simulation

Craig Crossman



IF you are a programmer, you are probably painfully aware of the vast number of programming languages available. At last count, I have identified more than 200 different languages! Most of us know the "Standard" languages such as BASIC, FORTRAN, COBOL, Pascal and Assembler. These are, for the most part, general multi-purpose languages that can be used for most any application, although many have stronger characteristics for certain uses. However, there are also "Specialty" languages that are designed from their inception to be used for very specific applications. LISP, for example, is used mostly for applications needing Artificial Intelligence (AI); SNOBOL is used where heavy text or string manipulations are required.

Language for Computer Modeling

Among these specialty languages is an interesting breed known as "Simulation" languages. These are primarily used by people interested in modeling by computer a real or artificial situation from which statistical information can be obtained, without the associated time and expense of setting up the actual situation. In many cases, the model could be something that would not even be possible to create in a real world environment with existing technology. Other barriers such as cost and time are good reasons to use modeling — for example, to get the results of a fifty year outcome.

Modeling can be done with virtually any type of situation: from simulating different traffic conditions at a major intersection, to assembly line production methods, to regulating how many people should be allowed in at one time in an amusement park. Virtually *anything* can be modeled on a computer, and the statistical information gathered could prove to be invaluable and near impossible to collect in any other fashion.

Two of the more popular simulation languages are GPSS and Dynamo. This article will deal with the former, but the general ideas expressed here could apply to most any of them.

GPSS is a formidable simulation language which, in the hands of a proficient programmer, can be made to do some very interesting models. GPSS, however, relies very heavily on a unique form of flowcharting. Flowcharting is a graphic representation of the logical flow that a program takes from its start to finish, usually showing all conditions and what happens in all possible cases. There has been a fairly successful effort to standardize the symbols used in flowcharting.

GPSS does *not* use these so-called standard symbols, basically because they would prove insufficient to handle the needs of a simulation language. Therefore, a unique set of graphic shapes and symbols are used by the GPSS programmer. These are far too many to talk about in this article, but we will discuss a few of them to make clear what is happening in the accompanying program... That's right! We are going to "simulate" a "simulation language" doing a "simulation"!

Bringing GPSS to Life

The Applesoft programs here attempt to show graphically what is happening in two simple GPSS models. You see, GPSS does *not* use graphics at all. The only results it gives are statistical numbers which must be interpreted by the statistician or model builder. This can be very abstract and confusing to the novice GPSS user. What I am attempting to do is to use graphics and animation to bring alive the static flow chart that GPSS programmers use to create these models. By actually *seeing* the transactions moving from one place in the flow chart to another, you should get a better idea as to the flow, and therefore, *how* and *why* GPSS works. The first thing we need to know are some terms.

A **TRANSACTION** is an event that moves through the model. This could be (and usually is) a person or some sort of vehicle.

A **FACILITY** is usually a part of the model through which these transactions move. It could, say, represent a teller's window at a bank. The bank could be the entire model, and the teller's window would be one of several facilities in the bank model. A facility is made up of a sequence of connecting blocks.

A **BLOCK** is a routine that usually has some sort of effect on the entering transaction. It could, say, delay it for a preset

time or could set it on a different route. Also, blocks can affect the *whole model* when a transaction enters it; the block could even terminate the entire model (program) if need be!

Building Blocks

Let's take a look at some of these blocks and what they do. It is how we put these blocks together that forms the GPSS program and how the transactions will be effected, thus illustrating the creation of the model.

GEN. This is the Generate block. Its function is to create a transaction. There are many fields (numbers) associated with this block, however, we will be concerned only with the first number. This represents the number of clock periods it will wait before creating a transaction. For example, if the number is five, every five cycles of the clock will see the creation of a transaction. So if the number is seven, we will see five transactions in thirty-five cycles of the clock.

TERM. This is the Terminate block. Its basic function is to either terminate a transaction or terminate the entire model's run. If the TERM block has a zero in its square extension, any transaction entering the TERM block will be terminated. If the TERM block has a one in its square extension, any transaction entering the TERM block will be terminated *and* the entire model, program, simulation will be at an end.

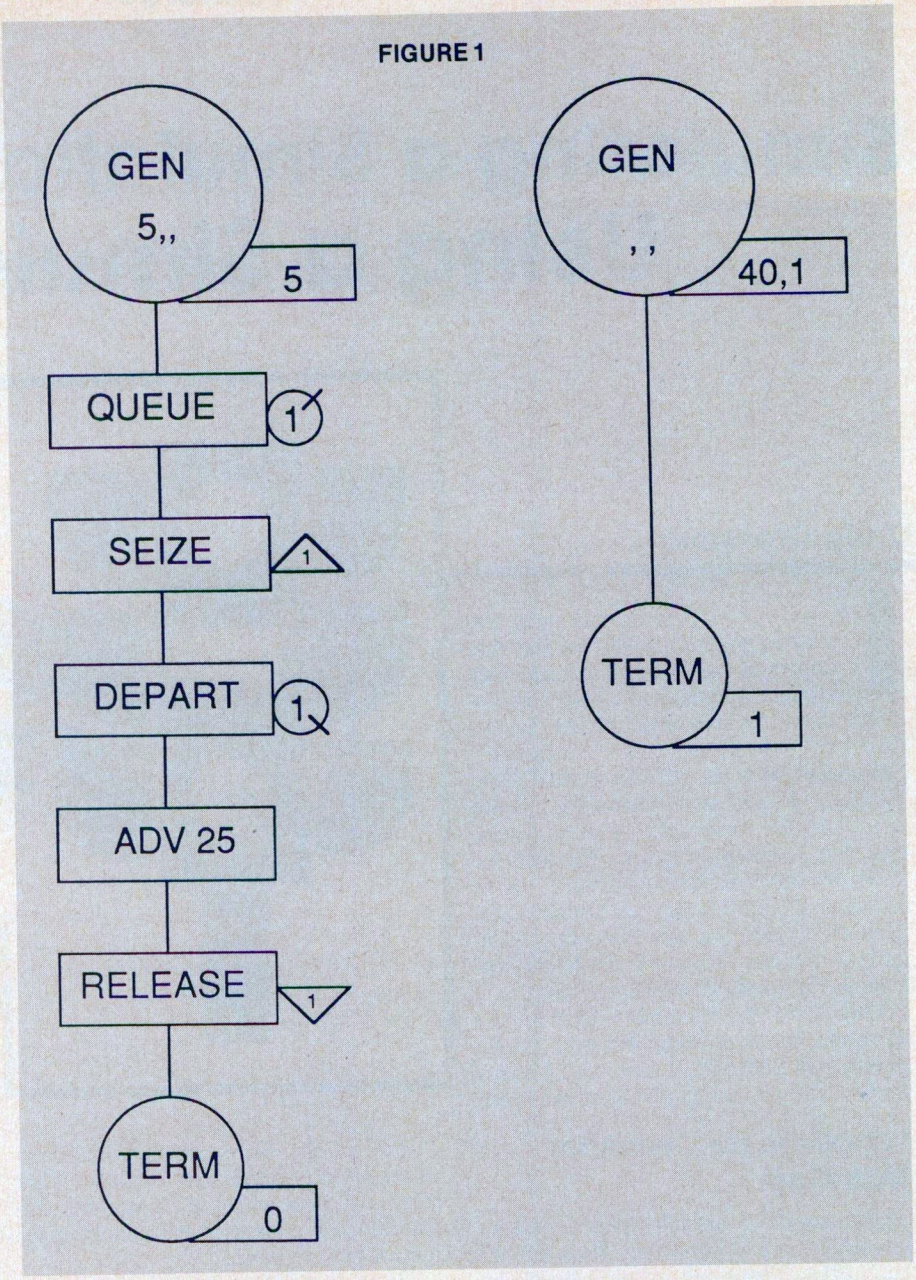
QUEUE. This is the QUEUE block. Its basic function is to hold transactions if, for some reason, the transaction is being prevented from continuing its path. A good, real-world example of this would be at the aforementioned bank. The teller's window is occupied (GPSS calls that SEIZING the facility) by a customer. You want to go to that teller's window but you see that it is occupied (seized). The bank has provided for this situation by providing a roped off waiting line (the QUEUE). So you stand in line and wait until the teller (facility) is available when the customer leaves (DEPART) and frees up (RELEASE) the teller (facility).

SEIZE. This block occupies the facility when a transaction passes through it and prevents any other transaction from entering the facility. In our above example, this occurs when the teller's window is taken up by the customer.

DEPART. This block is sort of like the 'NEXT' in a BASIC FOR-NEXT statement, but it is not a loop. It is needed to allow a transaction to be drawn out of the QUEUE block. It gives our customer in the QUEUE the potential to leave the window but it does not free up (RELEASE) the window. For that we need the RELEASE block.

RELEASE. When the transaction passes through the RELEASE block, the facility (teller's window) is now available for the next customer (transaction) who might be waiting in the line (QUEUE).

FIGURE 1



ADVANCE. One last factor we forgot! How *long* does the customer tie up (SEIZE) the teller's window? This is the function of the ADVANCE block. The ADVANCE block contains one number. That represents the number of clock cycles that the transaction will wait in that part of the facility.

The Bank Teller Model

We now have enough information to create a very simple model. The model will be our bank teller example, but it could be most *any* similar situation—a ticket booth at a movie house, a line of cars at a gas station, etc. Take a look at Figure 1. As you can see, the model consists of two parts. The longer of the two is our simple bank teller model. The second, smaller one is not a facility at all. Its function is to wait for forty clock cycles, generate a transaction, and have it go to a TERM block. Why? Well, banks *close*, don't they? The TERM block has a one in it and when that transaction generated at forty cycles enters the TERM block, the model finishes! Bank closed. Kaput. Finis. We want to see how many customers (transactions) will be served in the allotted forty-cycle time period if each customer takes twenty-five time periods at the teller's window. We also want to know how many customers will not be served and are waiting in line (the QUEUE). True, you could probably do this one in your head, but I think you are beginning to get an idea of how complex a sophisticated model could get! Try fifteen tellers with variable waiting times and all sorts of other parameters — something that would make even the most dazzling spreadsheet program shudder.

When you run the first demo program (Listing 1), it will wait for you to press any

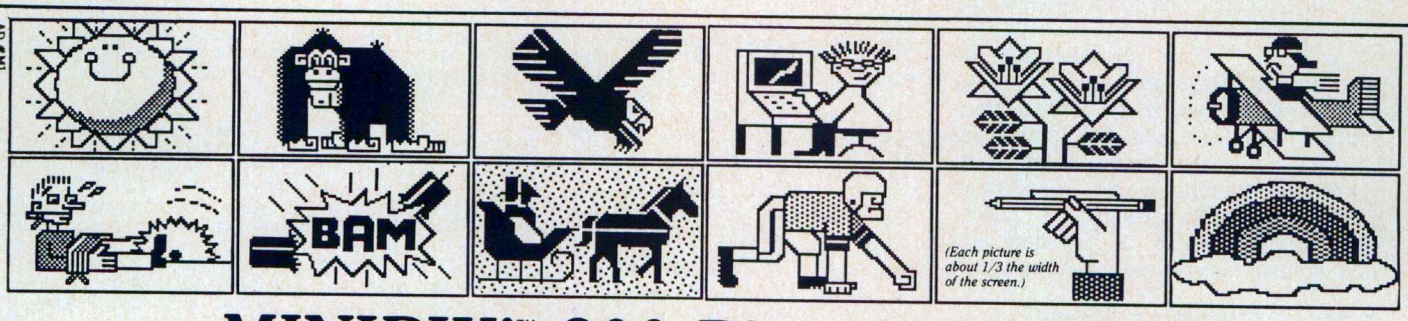
key to start it. Follow the transactions (the moving little vertical lines) and you will see how the model comes 'alive'.

Let's follow what happens in the model as you run it. When you start the program by pressing any key, the first thing you will see happen is the running of the clock cycle. It will go to five without anything happening. When five cycles pass, the GENerate block on the left will create a transaction. This passes through the QUEUE block since it is not being blocked by anything. This would be our first customer going right to the teller, since the teller is available and there are no people waiting in line. The transaction passes through the SEIZE block. This now ties up the facility and the program displays this event on the screen.

The transaction passes through the DEPART block and into the ADVANCE 25 block where it will wait for 25 more cycles of the clock before it goes to the RELEASE block. The clock now restarts its cycles. At the next five (a total of ten so far) cycles, another transaction is created in the GENerate 5 block. It goes to the QUEUE block but it is not allowed to continue since the facility is SEIZEd. So there it waits and the clock continues for another five cycles. A third transaction is created, passes to the QUEUE block, and waits along with the other previous transaction. A line (QUEUE) is building up! This continues three more times until we have a total of five transactions waiting in line. It is at this time that twenty-five cycles have passed since the transaction entered the

LISTING 1

```
5  REM  *** GPSS DEMO PROGRAM #1 ***
10  HOME
20 D$ =  CHR$ (4)
30  PRINT D$;"BLOAD ALPHA.BIN"
40  POKE 232,00: POKE 233,96
50  DIM X(50),Y(50):PI = 3.1415926:P3 = PI / 25
60  HGR
70  HCOLOR= 3
80  ROT= 0: SCALE= 1
90  GOTO 150
100 P4 = H * R: FOR I = 0 TO 50:A = I * P3: REM P3=PI/25
110 X(I) = XC + R *  COS (A):Y(I) = YC + P4 *  SIN (A)
120  IF I = 0 THEN  HPLOT X(0),Y(0)
130  HPLOT  TO X(I),Y(I): NEXT
140  RETURN
150 XC = 140:YC = 16:H = .78:R = 20: GOSUB 100
160  HPLOT 160,20 TO 180,20 TO 180,30 TO 150,30
170  HPLOT 138,31 TO 138,35
180  HPLOT  TO 158,35 TO 158,50 TO 118,50 TO 118,35 TO 138,35
190  HPLOT 138,50 TO 138,55
200  HPLOT  TO 158,55 TO 158,70 TO 118,70 TO 118,55 TO 138,55
210  HPLOT 138,70 TO 138,75
220  HPLOT  TO 158,75 TO 158,90 TO 118,90 TO 118,75 TO 138,75
230  HPLOT 138,90 TO 138,95
240  HPLOT  TO 158,95 TO 158,110 TO 118,110 TO 118,95 TO 138,95
250  HPLOT 138,110 TO 138,115
260  HPLOT  TO 158,115 TO 158,130 TO 118,130 TO 118,115 TO 138,115
270  HPLOT 138,131 TO 138,132
280 XC = 138:YC = 145:H = .78:R = 15: GOSUB 100
290  HPLOT 152,146 TO 165,146 TO 165,156 TO 143,156
300 XC = 168:YC = 40:H = .78:R = 8: GOSUB 100
310  HPLOT 170,38 TO 176,32
320  HPLOT 160,65 TO 176,65 TO 168,55 TO 160,65
330 XC = 168:YC = 80:H = .78:R = 8: GOSUB 100
340  HPLOT 170,82 TO 176,88
350  HPLOT 160,120 TO 176,120 TO 168,130 TO 160,120
360 XC = 230:YC = 40:H = .78:R = 20: GOSUB 100
```

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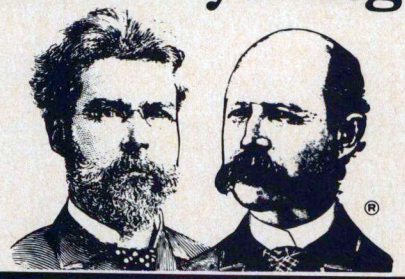

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ADVANCE 25 block (actually a total of thirty cycles have passed in the entire model).

GPSS now starts its scan phase and allows the transaction in the ADVANCE 25 block to continue on. This is the customer at the teller's window finishing business and leaving. It passes through the RELEASE block, releasing the facility. It continues to go to the TERMinate block, where it leaves the model (bank). Since the TERMinate block has a zero in its extention, the model does not end its run. Now, still in the same clock cycle, GPSS checks to make sure that all transactions in the current model have progressed as far as possible in the model. This is the re-scan phase. Sure enough, it is now possible to take the first transaction in the QUEUE and let it continue on in the facility since the facility is now released.

It then proceeds through the SEIZE block seizing the facility. It passes through the DEPART block and stays in the ADVANCE 25 block. The clock now restarts and five more cycles pass. Another transaction is created in the GENerate 5 block. It goes into the QUEUE block and gets in line behind the others that are in there. At a total of forty cycles, a transaction is born in the right hand GENerate block. It goes to the TERMinate block below it and since that TERMinate block contains a one, the model finishes its run!

At the end of the run, instead of the numerical printouts you get in the real GPSS language, just count the little lines (transactions) and you will have the answers to the bank teller problem. Also, you will have to count the number of transactions that went through the TERM block for the number of customers that were actually served. Go ahead and try it.

A More Complex Model

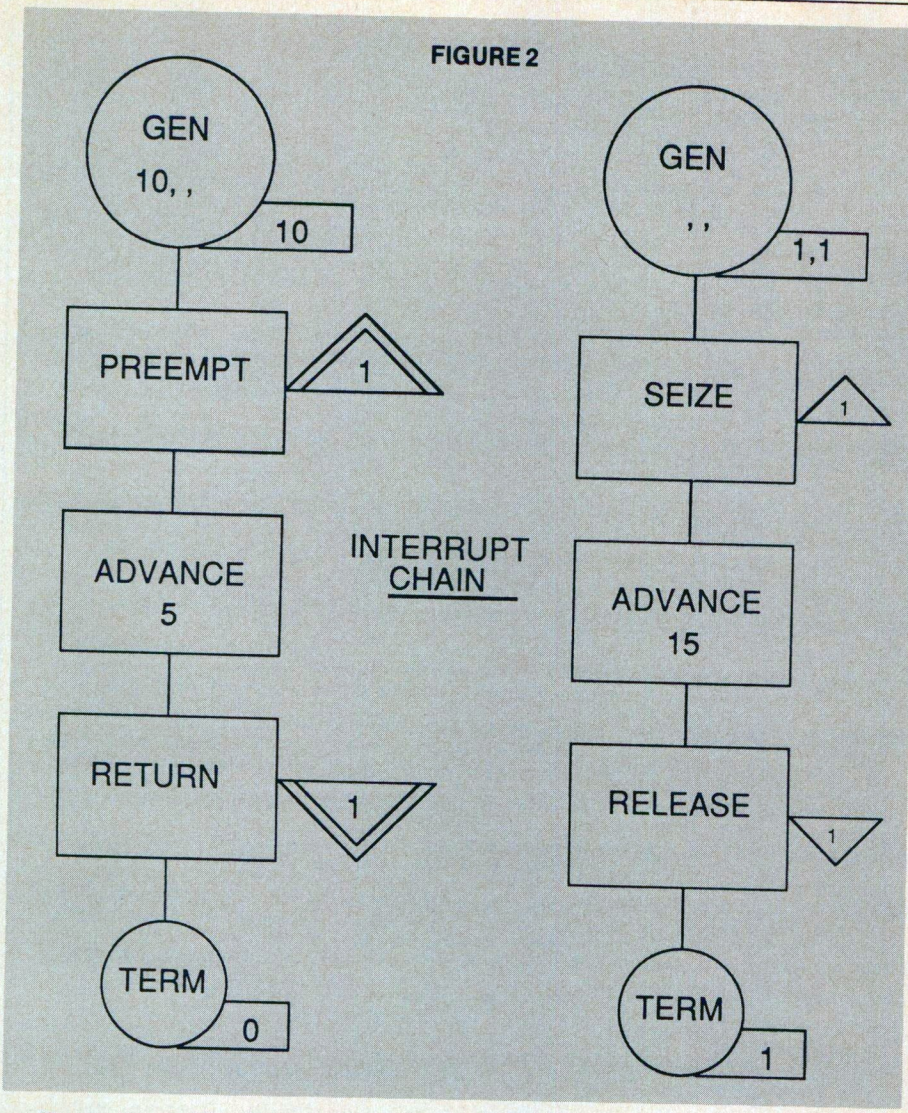
You think you understand it all? Good! Now we'll get into the second example. To do this, a few more definitions are needed to explain what is happening in the second model.

PREEMPT. This block will cause a facility to be interrupted from its normal flow of action. The number in the double triangle that is attached to this block represents the number of the facility that it will interrupt. The transaction is removed from the facility and placed on something we call an interrupt chain, which is like a holding area for preempted transactions. The clock will continue to count cycles, but as long as the facility is preempted it is in a suspended state and will not be effected in any way. Time, so to speak, stops for it.

RETURN. This block ends the state of preemption caused by the preempt block. The transaction that was interrupted by the preempt block will be placed back from the interrupt chain to the facility it was removed from, and continue to act ac-

```
370  HPLOT 252,44 TO 279,44 TO 279,54 TO 240,54
380  HPLOT 228,56 TO 228,84
390 XC = 228:YC = 98:H = .78:R = 17: GOSUB 100
400  HPLOT 244,100 TO 265,100 TO 265,109 TO 235,109
410  SCALE= 1
420 M$ = "GEN":Q = 225:Z = 30: GOSUB 490
430  DRAW 37 AT 230,46: DRAW 37 AT 237,46
440  DRAW 30 AT 255,46: DRAW 36 AT 262,46: DRAW 37 AT 268,51: DRAW 27 AT
     275,46
450 M$ = "TERM":Q = 218:Z = 95: GOSUB 490
460  DRAW 27 AT 254,101
470  SCALE= 1: ROT= 1
480  GOTO 540
490  FOR I = 1 TO  LEN (M$)
500  DRAW  ASC ( MID$ (M$,I,1)) - 64 AT Q,Z
510 Q = Q + 7
520  NEXT I
530  RETURN
540 M$ = "GEN":Q = 134:Z = 8: GOSUB 490
550  DRAW 31 AT 141,22: DRAW 37 AT 146,24: DRAW 37 AT 151,24: DRAW 31 AT
     170,22
560 M$ = "QUEUE":Q = 126:Z = 38: GOSUB 490
570 M$ = "SEIZE":Q = 126:Z = 58: GOSUB 490
580 M$ = "DEPRT":Q = 126:Z = 78: GOSUB 490
590 M$ = "ADV":Q = 126:Z = 98: GOSUB 490
600  DRAW 28 AT 149,101: DRAW 31 AT 156,101
610 M$ = "RELSE":Q = 126:Z = 118: GOSUB 490
620 M$ = "TERM":Q = 131:Z = 141: GOSUB 490
630  DRAW 27 AT 169,37
640  DRAW 27 AT 169,77
650  DRAW 27 AT 170,59
660  DRAW 27 AT 170,119
670  DRAW 36 AT 160,148
680  VTAB 22: PRINT "CLOCK TIME : ";TI
690  VTAB 22: HTAB 30: PRINT "START   1"
700  GET A$
710  FOR TI = 1 TO 5
720  VTAB 22: PRINT "CLOCK TIME : ";TI
730  FOR T2 = 1 TO 500: NEXT T2: NEXT TI
740  SCALE= 4
750  FOR I = 20 TO 105
760  XDRAW 38 AT 134,I: FOR WW = 1 TO 20: NEXT WW: XDRAW 38 AT 134,I
770  IF I = 60 THEN  VTAB 23: INVERSE : PRINT  CHR$ (7);"FAC 1: SEIZED":
     NORMAL : FOR UU = 1 TO 1000: NEXT UU: VTAB 23: PRINT "FAC 1: SEIZED
     "
780  NEXT I
790  FOR WW = 1 TO 20: XDRAW 38 AT 136,I: FOR WA = 1 TO 40: NEXT WA: XDRAW
     38 AT 136,I: FOR WB = 1 TO 40: NEXT WB: NEXT WW: XDRAW 38 AT 136,I
800 QR = 5: FOR TI = 6 TO 10: VTAB 22: PRINT "CLOCK TIME : ";TI: FOR T2 =
     1 TO 500: NEXT T2: NEXT TI
810  FOR J = 20 TO 46
820  XDRAW 38 AT 134,J: FOR WW = 1 TO 20: NEXT WW: XDRAW 38 AT 134,J
830  NEXT J:QZ = QZ + 3: DRAW 38 AT 136 + QZ,J:QQ = QQ + 1: IF QQ <  > 5
     THEN QR = QR + 5: FOR TI = QR TO QR + 5: VTAB 22: PRINT "CLOCK TIME
     : ";TI: FOR T2 = 1 TO 500: NEXT T2: NEXT TI: GOTO 810
840  VTAB 23: HTAB 20: INVERSE : PRINT  CHR$ (7);"START SCAN PHASE": FOR
     UU = 1 TO 1000: NEXT UU: NORMAL : VTAB 23: HTAB 20: PRINT "START SCA
     N PHASE"
850  FOR WW = 1 TO 20: XDRAW 38 AT 136,I: FOR WA = 1 TO 40: NEXT WA: XDRAW
     38 AT 136,I: FOR WB = 1 TO 40: NEXT WB: NEXT WW: XDRAW 38 AT 136,I
860  FOR I = 105 TO 150: XDRAW 38 AT 136,I: FOR WB = 1 TO 40: NEXT WB: XDRAW
     38 AT 136,I
870  IF I = 125 THEN  VTAB 23: INVERSE : PRINT  CHR$ (7);"FAC 1: RELEASE
     D ": NORMAL : FOR UU = 1 TO 1000: NEXT UU: VTAB 23: PRINT "FAC 1: RE
     LEASED "
880  NEXT I: FOR YY = 1 TO 800: NEXT YY
890  VTAB 23: HTAB 20: INVERSE : PRINT  CHR$ (7); CHR$ (7);"RESTART SCAN
     PHASE": NORMAL : FOR UU = 1 TO 1000: NEXT UU: VTAB 23: HTAB 20: PRINT
     "RESTART SCAN PHASE"
900  FOR K = 1 TO 20: XDRAW 38 AT 139,47: FOR WA = 1 TO 40: NEXT WA: XDRAW
     38 AT 139,47: FOR WB = 1 TO 40: NEXT WB: NEXT K
910  XDRAW 38 AT 139,47: FOR K = 46 TO 105: XDRAW 38 AT 134,K: FOR WA =
     1 TO 40: NEXT WA: XDRAW 38 AT 134,K
920  IF K = 60 THEN  VTAB 23: INVERSE : PRINT  CHR$ (7);"FAC 1: SEIZED
     ": NORMAL : FOR UU = 1 TO 1000: NEXT UU: VTAB 23: PRINT "FAC 1: SEIZ
     ED   "
930  NEXT K
940  XDRAW 38 AT 134,106
950  FOR I = 1 TO 20: XDRAW 38 AT 134,106: FOR WA = 1 TO 20: NEXT WA: XDRAW
     38 AT 134,106: FOR WB = 1 TO 20: NEXT WB: NEXT I
960  VTAB 23: HTAB 20: PRINT "                    "
970 QR = 31: FOR TI = 31 TO 35: VTAB 22: PRINT "CLOCK TIME : ";TI: FOR T
     2 = 1 TO 500: NEXT T2: NEXT TI
980  FOR J = 20 TO 46
990  XDRAW 38 AT 134,J: FOR WW = 1 TO 20: NEXT WW: XDRAW 38 AT 134,J
1000  NEXT J:QZ = QZ + 3: DRAW 38 AT 136 + QZ,J:QR = QR + 5: FOR TI = QR
     TO QR + 4: VTAB 22: PRINT "CLOCK TIME : ";TI: FOR T2 = 1 TO 500: NEXT
     T2: NEXT TI
1010  FOR I = 40 TO 104: XDRAW 38 AT 225,I: FOR WA = 1 TO 20: NEXT WA: XDRAW
     38 AT 225,I: FOR WB = 1 TO 20: NEXT WB: NEXT I
1020  VTAB 22: HTAB 38: FLASH : PRINT "0": NORMAL
1030  PRINT  CHR$ (7); CHR$ (7); CHR$ (7): HOME : VTAB 22: PRINT "GPSS-X
     8 NORMAL COMPLETION OF SIMULATION                    RUN"
1040  VTAB 1: END
1050  REM ARKABLE PROGRAM BY     CRAIG CROSSMAN
```

FIGURE 2



cording to that facility. The difference is that—although time was frozen for the transaction and, thus, the facility—in actual fact a great deal of time could have passed while it was in this state!

We are now ready to look at the last example. Take a look at Figure 2. As before, we see that a transaction is to be generated in the facility number one (the flow diagram on the right). However, only one transaction will be generated and that is at the first cycle of the clock. As it passes through the SEIZE block, the facility is in use and no other transactions would be allowed through. For the sake of simplicity, we are only generating one transaction; therefore, no QUEUE block was needed in this example.

After seizing the facility, the transaction passes into the ADVANCE block and must remain there for fifteen clock cycles before being allowed to continue into the RELEASE block. Now, here comes the new twist! As the clock hits the tenth cycle, a new transaction is born in the left flow diagram. It passes through the preempt block and preempts the first facility. It is at this point that all time is suspended for facility number one, and we see the transaction removed from the ADVANCE block containing the fifteen cycle hold and placed on the interrupt chain.

After this is done, the clock now continues to cycle for five more times but as far as facility number one is concerned, *no time has passed*. After those five cycles finish, the transaction in the ADVANCE five block has met the required hold and is allowed to continue. When it passes through the RETURN block, a scan phase is started. What this does first is to stop the clock and check the interrupt chain to see if there are any transactions on the interrupt chain related to facility number one (since the RELEASE block has a one in its triangle)—and, if there are, return them to the facility. Since there is a transaction on the interrupt chain, it is placed back in the block it was removed from (ADVANCE 15).

The transaction that was in the RETURN block is allowed to continue to the TERMinate block, where it is terminated. Since the TERMinate block has a zero in its extension, the model is allowed to continue. As far as the ADVANCE 15 block is concerned, only *nine* clock cycles have passed, when in fact *fifteen* have passed in real time. This being the case, the transaction in ADVANCE 15 thinks it's been there only nine cycles, and therefore does not leave the ADVANCE 15 block and must wait for six more cycles to pass. The clock now continues to cycle five more times.

At this time, another ten cycles have passed since the first preempt transaction was born, and the GENerate 10 block creates another transaction. It travels to the preempt block and the same thing happens all over again! The ADVANCE 5 transaction is placed on the interrupt chain for the second time. The preempt transaction allows five more cycles to pass and then it returns the interrupted transaction to the ADVANCE block. At this point, twenty-five real time cycles have occurred, but facility one is only aware of fourteen of them! The clock, therefore, must cycle one additional time (for a total of twenty-six cycles) so as to fulfill the fifteen-clock-cycle wait requirement of the ADVANCE 15 block. When this happens, the transaction in the ADVANCE 15 block is allowed to continue. It goes to the TERMinate block, and since it has a one in its extension, the transaction and the entire model ends its run.

Red Light—Green Light

A good example of a real world application of this model would be a traffic intersection with a stop light set to stay red for a certain length of time, near a railroad crossing. This particular light could detect the presence of the train and stay red during the train's presence, but it also has been set up to finish out its remaining red time after the train has released it. Normally, only a certain time would be involved in waiting for a red light. But, every so often, a regularly scheduled train will show up and interrupt the normal waiting time for a car, and increase it by a certain factor. Then, after the train has passed, the traffic light—having no sensors to detect the additional passing of time—finishes out its red light phase before changing to green. True, we had only one interruption in my train example; but if we had a *very* long light, it might not finish out its red condition before another train interrupted it again, delaying the green light even more. (If you know where this intersection is, please let me know so I can avoid it)...

Well, there you have it. Obviously, GPSS is a very detailed language, and we have just scratched the surface of this fascinating topic in this article. Simulation model building is just one more way that computers save us time and money, and give us an advance window into what could be a miserable failure or a viable solution to a problem.

Craig Crossman is Vice President of Operations for an authorized Apple dealer in Palm Beach, Florida. He has a degree in Computer Science and is the Apple Expert for The Source.

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LISTING 2

```
5  REM   *** GPSS DEMO PROGRAM #2 ***
10  HOME :D$ =  CHR$ (4): PRINT D$;"BLOAD ALPHA.BIN": POKE 232,00: POKE
    233,96: DIM X(50),Y(50):PI = 3.1415926:P3 = PI / 25: HGR : HCOLOR= 3
    : ROT= 0: SCALE= 1: GOTO 40
20 P4 = H * R: FOR I = 0 TO 50:A = I * P3
30 X(I) = XC + R *  COS (A):Y(I) = YC + P4 *  SIN (A): NEXT : HPLOT X(0)
    ,Y(0): FOR I = 1 TO 50: HPLOT  TO X(I),Y(I): NEXT : RETURN
40 XC = 80:YC = 16:H = .78:R = 20: GOSUB 20: HPLOT 100,20 TO 120,20 TO 1
    20,30 TO 90,30: HPLOT 78,31 TO 78,35: HPLOT  TO 98,35 TO 98,60 TO 58
    ,60 TO 58,35 TO 78,35
50  HPLOT 78,60 TO 78,65: HPLOT  TO 98,65 TO 98,90 TO 58,90 TO 58,65 TO
    78,65: HPLOT 78,90 TO 78,95: HPLOT  TO 98,95 TO 98,120 TO 58,120 TO
    58,95 TO 78,95
60 TB = 11
70  HPLOT 78,120 TO 78,124:XC = 78:YC = 137:H = .78:R = 15: GOSUB 20: HPLOT
    94,138 TO 107,138 TO 107,148 TO 85,148:XC = 228:YC = 16:H = .78:R =
    20: GOSUB 20: HPLOT 249,20 TO 277,20 TO 277,30 TO 238,30
80  HPLOT 228,31 TO 228,35: HPLOT 208,35 TO 248,35 TO 248,60 TO 208,60 TO
    208,35: HPLOT 228,60 TO 228,65
90  HPLOT 208,65 TO 248,65 TO 248,90 TO 208,90 TO 208,65: HPLOT 228,90 TO
    228,95: HPLOT 208,95 TO 248,95 TO 248,120 TO 208,120 TO 208,95: HPLOT
    228,120 TO 228,124
100 XC = 228:YC = 137:H = .78:R = 15: GOSUB 20: HPLOT 244,138 TO 263,138
     TO 263,148 TO 235,148: HPLOT 100,55 TO 115,40 TO 130,55 TO 100,55: HPLOT
    104,55 TO 115,44 TO 126,55
110  HPLOT 100,100 TO 115,115 TO 130,100 TO 100,100: HPLOT 104,100 TO 11
    5,111 TO 126,100
120  HPLOT 250,55 TO 265,40 TO 279,55 TO 250,55: HPLOT 250,100 TO 265,11
    5 TO 279,100 TO 250,100:M$ = "GEN":Q = 75:Z = 10: GOSUB 140: DRAW 27
     AT 72,20: DRAW 36 AT 79,20
130  DRAW 37 AT 84,25: DRAW 37 AT 89,25: DRAW 27 AT 105,22: DRAW 36 AT 1
    12,22:M$ = "PREMT":Q = 66:Z = 40: GOSUB 140: GOTO 150
140  FOR I = 1 TO  LEN (M$): DRAW  ASC ( MID$ (M$,I,1)) - 64 AT Q,Z:Q =
    Q + 7: NEXT I: RETURN
150 M$ = "ADVAN":Q = 66:Z = 70: GOSUB 140: DRAW 31 AT 80,80:M$ = "RETRN"
    :Q = 66:Z = 100: GOSUB 140:M$ = "TERM":Q = 68:Z = 135: GOSUB 140: DRAW
    36 AT 102,140:M$ = "GEN":Q = 222:Z = 10: GOSUB 140: DRAW 37 AT 228,2
    5
160  DRAW 37 AT 235,25: DRAW 27 AT 252,22: DRAW 37 AT 255,27: DRAW 27 AT
    262,22
170 M$ = "SEIZE":Q = 217:Z = 40: GOSUB 140:M$ = "ADVAN":Q = 217:Z = 70: GOSUB
    140: DRAW 27 AT 227,80: DRAW 31 AT 234,80:M$ = "RELSE":Q = 217:Z = 1
    00: GOSUB 140
180 M$ = "TERM":Q = 220:Z = 135: GOSUB 140: DRAW 27 AT 252,140: DRAW 27 AT
    118,48: DRAW 27 AT 118,101: DRAW 27 AT 267,47: DRAW 27 AT 267,103:M$
     = "INTERRUPT":Q = 132:Z = 60: GOSUB 140:M$ = "CHAIN":Q = 156
190 Z = 69: GOSUB 140: HPLOT 152,79 TO 185,79: VTAB 22: PRINT "CLOCK TIM
    E : ";TI: VTAB 22: HTAB 30: PRINT "START   1": GET A$
200  FOR TI = 0 TO 1: VTAB 22: PRINT "CLOCK TIME : ";TI: FOR T2 = 1 TO 5
    00: NEXT T2: NEXT TI: SCALE= 4: FOR I = 20 TO 85: XDRAW 38 AT 235,I:
     FOR WW = 1 TO 20: NEXT WW: XDRAW 38 AT 235,I
210  IF I = 50 THEN  VTAB 23: INVERSE : PRINT  CHR$ (7);: PRINT "FAC 1:
    SEIZED": NORMAL : FOR UU = 1 TO 1000: NEXT UU: VTAB 23: PRINT "FAC 1
    : SEIZED"
220  NEXT I: FOR WW = 1 TO 20: XDRAW 38 AT 235,I: FOR WA = 1 TO 40: NEXT
    WA: XDRAW 38 AT 235,I: FOR WB = 1 TO 40: NEXT WB: NEXT WW: XDRAW 38 AT
    235,I: FOR TI = 2 TO 10: VTAB 22: PRINT "CLOCK TIME : ";TI: FOR T2 =
    1 TO 800: NEXT T2,TI
230  FOR J = 20 TO 85
240  XDRAW 38 AT 90,J: FOR WW = 1 TO 20: NEXT WW: XDRAW 38 AT 90,J: IF J
     = 56 THEN  XDRAW 38 AT 90,J: VTAB 23: PRINT  SPC( 30): VTAB 23: HTAB
    1: INVERSE : PRINT "FAC 1:PREEMPTED": PRINT  CHR$ (7); CHR$ (7);: FOR
    WW = 1 TO 1000: NEXT WW: NORMAL : VTAB 23: PRINT "FAC 1:PREEMPTED"
250  IF J = 56 THEN  FOR WW = 1 TO 20: XDRAW 38 AT 90,J: FOR WA = 1 TO 4
    0: NEXT WA: XDRAW 38 AT 90,J: FOR WB = 1 TO 40: NEXT WB,WW
260  IF J = 56 THEN  FOR WW = 1 TO 20: XDRAW 38 AT 235,86: FOR WA = 1 TO
    40: NEXT WA: XDRAW 38 AT 235,86: FOR WB = 1 TO 40: NEXT WB,WW
270  IF J = 56 THEN  XDRAW 38 AT 235,86: FOR X = 235 TO 170 STEP  - 1: XDRAW
    38 AT X,86: FOR WW = 1 TO 10: NEXT WW: XDRAW 38 AT X,86: NEXT X
280  IF J = 56 THEN  FOR WW = 1 TO 20: XDRAW 38 AT X,86: FOR WA = 1 TO 4
    0: NEXT WA: XDRAW 38 AT X,86: FOR WB = 1 TO 40: NEXT WB,WW: XDRAW 38
     AT X,86: XDRAW 38 AT 90,J
290  NEXT J: XDRAW 38 AT 90,J: FOR WW = 1 TO 20: XDRAW 38 AT 90,J: FOR W
    A = 1 TO 40: NEXT WA: XDRAW 38 AT 90,J: FOR WB = 1 TO 40: NEXT WB: NEXT
    WW: FOR TI = TB TO TB + 4: VTAB 22: PRINT "CLOCK TIME : ";TI: FOR T2
     = 1 TO 800: NEXT T2,TI
300  XDRAW 38 AT 90,86: FOR J = 87 TO 140: XDRAW 38 AT 90,J: FOR WA = 1 TO
    20: NEXT WA: XDRAW 38 AT 90,J: IF J = 114 THEN  VTAB 23: INVERSE : PRINT
    "FAC 1:RETURNED TO SEIZER": PRINT  CHR$ (7);: NORMAL : FOR UU = 1 TO
    1000: NEXT UU: VTAB 23: PRINT "FAC:1:RETURNED TO SEIZER"
310  IF J = 114 THEN  XDRAW 38 AT 169,86: FOR X = 170 TO 234: XDRAW 38 AT
    X,86: FOR WW = 1 TO 10: NEXT WW: XDRAW 38 AT X,86: NEXT X: XDRAW 38 AT
    X,86
320  IF J = 114 THEN  FOR WW = 1 TO 20: XDRAW 38 AT X,86: FOR WA = 1 TO
    40: NEXT WA: XDRAW 38 AT X,86: FOR WB = 1 TO 40: NEXT WB,WW
330  NEXT J
340  FOR TI = TB + 5 TO TB + 9: FOR T2 = 1 TO 800: NEXT T2: VTAB 22: PRINT
    "CLOCK TIME : ";TI: IF TI = 26 THEN 370
350  NEXT TI
360 TB = 21: IF C = 0 THEN C = 1: GOTO 230
370  XDRAW 38 AT 235,86: FOR I = 87 TO 140: XDRAW 38 AT 235,I: FOR WW =
    1 TO 20: NEXT WW: XDRAW 38 AT 235,I
380  IF I = 112 THEN  VTAB 23: PRINT  SPC( 38): VTAB 23: HTAB 1: INVERSE
    : PRINT "FAC 1:RELEASED": PRINT  CHR$ (7); CHR$ (7);: FOR UU = 1 TO
    1000: NEXT UU: NORMAL : VTAB 23: PRINT "FAC 1:RELEASED"
390  NEXT I
```

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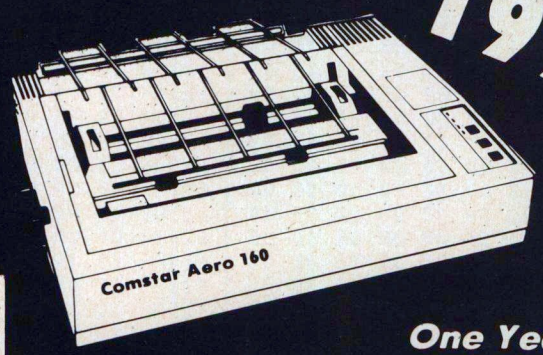

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```
400  VTAB 22: HTAB 38: FLASH : PRINT "0": NORMAL : FOR I = 1 TO 5: PRINT
     CHR$ (7);: NEXT I: HOME : VTAB 22: PRINT "GPSS-X8 NORMAL COMPLETION
     OF SIMULATION                    RUN": VTAB 1: END
410  REM ARKABLE PROGRAM BY     CRAIG CROSSMAN
```

LISTING 3: SHAPE TABLE

```
6000- 26 00 FF 01 0D 02 1D 02
6008- 28 02 35 02 41 02 4B 02
6010- 58 02 65 02 70 02 79 02
6018- 86 02 90 02 9F 02 AD 02
6020- B9 02 C6 02 D5 02 E3 02
6028- F0 02 F8 02 02 03 0D 03
6030- 1A 03 27 03 30 03 3E 03
6038- 4C 03 58 03 65 03 71 03
6040- 7C 03 88 03 93 03 A3 03
6048- B2 03 C1 03 C5 03 00 89
6050- 2E 00 00 00 50 34 85 4D
6058- EB 85 1F 41 00 83 23 85
6060- 1E CA 4D 80 04 75 0C 00
6068- 00 58 00 86 68 00 00 00
6070- 59 00 88 0C 00 00 00 44
6078- 58 83 60 00 00 00 46 00
6080- 81 00 00 00 00 58 00 06
6088- 01 01 00 33 87 62 00 00
6090- 00 87 61 7A C5 1E 87 5F
6098- ED 2E 5D 87 5D 5D 80 E8
60A0- 87 59 D6 13 E6 87 55 65
60A8- 26 B8 87 50 1C A7 71 87
60B0- 4A 11 EA 7A 87 43 5D 54
60B8- 6C 87 3C 19 F7 9A 87 34
60C0- 65 26 C7 87 2C 5D FE BD
60C8- 87 24 24 E8 B8 87 1B DB
60D0- 17 83 87 13 A2 01 7C 87
60D8- 0B 9A D9 71 87 03 E6 08
60E0- 9B 86 79 45 57 8C 86 6B
60E8- DC 2B 65 86 5F C6 B1 6D
60F0- 86 55 35 B2 D6 86 4C 53
60F8- D8 6A 86 45 44 FE 5B 86
6100- 40 25 A3 64 86 3D 0A 75
6108- D2 86 3C 00 00 25 86 3D
6110- 0A 75 B5 86 40 25 A3 29
6118- 86 45 44 FE 04 86 4C 53
6120- D7 FB 86 55 35 B2 4B 86
6128- 5F C6 B0 CB 86 6B DC 2A
6130- B1 86 79 45 56 C4 87 03
6138- E6 08 32 87 0B 9A D9 02
6140- 87 13 A2 01 0B 87 1B DB
6148- 17 0F 87 24 24 E8 42 87
6150- 2C 5D FE 4D 87 34 65 26
6158- 59 87 3C 19 F7 31 87 43
6160- 5D 54 09 87 4A 11 EA 1F
```

How to Enter the Shape Table Code

The following is a brief description on how to type in the shape table code. It is not my intent to explain the function of this code, but to merely detail the procedure on how to enter it into the computer and then save it to disk. First, make sure you have either DOS 3.3 or ProDOS loaded. There are many ways to do this. You can load DOS 3.3 by booting up with the DOS 3.3 system master disk. ProDOS users can use their Filer disk and then type the letter B from the menu. Also, make sure you have a formatted disk in the corresponding operating system with plenty of room on it, so you can save your programs to it. Next, type:

CALL -151

This puts you in the Apple's monitor. You should see an asterisk (*) as your prompt instead of the familiar right square bracket of Applesoft (]). Next, you must tell the Apple the starting address (location) where you want the code you are about to type to be stored. In this case, that would be 6000. So, you would type:

6000:

Note the colon following the address! Now, start typing in the listing as shown. A good rule to keep track of where you are is to type in two lines of eight bytes each (a byte is one two-letter/number grouping) and then press the Return key. Then, before you type in the next two lines, type a colon, so as to inform the Apple's monitor that the code you are typing is to be placed in memory, right after the last byte you typed. An example of how to do this would be as follows:

6000:26 00 FF 01 00 02 1D 02 28 02 35 02 41 02 4B 02<RETURN>
:58 02 65 02 70 02 79 02 86 02 90 02 9F 02 AD 02<RETURN>
:B9 etc. . .

This keeps it simpler to catch typo mistakes as this can happen very easily with this kind of data entry!

After you have typed in the entire shape table, you must save it to disk. In this case, you simply type from the asterisk prompt:

BSAVE ALPHA.BIN, A$6000,L$3C8

The A$ is the starting address in hex, and the L$ is the length of the code in hex. If you don't understand that, don't worry about it! It is not necessary that you understand any of this for the purpose of this article.

Reboot your system and enter the two BASIC programs listed here as usual.

```
6168- 87 50 1C A7 23 87 55 65
6170- 26 74 87 59 D6 13 AE 87
6178- 5D 5D 80 BD 87 5F ED 2E
6180- 40 87 61 7A C5 10 87 61
6188- FF FF DB 59 00 06 01 01
6190- 00 33 87 24 00 00 00 87
6198- 2A 73 C0 6A 87 30 CD 74
61A0- 42 87 36 F3 78 1F 87 3C
61A8- CC F9 49 87 42 42 59 E8
61B0- 87 47 3D 90 65 87 4B AA
61B8- 80 5E 87 4F 77 4B DA 87
61C0- 52 94 9B 67 87 54 F5 DC
61C8- 10 87 56 91 72 1C 87 57
61D0- 60 DF DD 87 57 60 DF E0
61D8- 87 56 91 72 25 87 54 F5
61E0- DC 1E 87 52 94 9B 7A 87
61E8- 4F 77 4B F2 87 4B AA 80
61F0- 7C 87 47 3D 90 87 87 42
61F8- 42 5A 0D 87 3C CC F9 1B
6200- 1E 1E 36 36 44 2D 56 24
6208- 24 1C 1C 00 73 03 3F 37
6210- 36 36 2E 2D 05 20 DC 2B
6218- 2D 20 1C 00 8B E2 3F 17
6220- 36 36 0E 2D 05 20 00 DF
6228- 03 3F 37 36 36 2E 2D 05
6230- 20 24 24 00 AA 3F 3F 36
6238- 2E 2D DE 33 2E 2D 25 00
6240- 59 3F 3F 36 2E 2D DF 32
6248- 36 00 D8 E2 3F 17 36 36
6250- 0E 2D 05 20 3F 07 00 36
6258- 36 3E 3F 27 24 96 32 6E
6260- 09 24 04 00 86 3F 3F 4E
6268- 36 36 3E 6F 29 05 00 00
6270- 36 36 36 3B 3F 20 04 00
6278- 87 1E 1E 1E 0E 0E 0E DF
6280- 23 24 24 24 00 8B 1B 1B
6288- 36 36 36 2D 2D 05 00 FF
6290- 92 92 24 24 24 17 D6 E4
6298- 1C 36 36 36 06 00 00 36
62A0- 36 36 C4 04 03 1C C4 36
62A8- 36 36 06 00 FF 3B BF 36
62B0- 36 0E 2D 05 20 24 24 00
62B8- FF 3B 3F 36 36 36 0C 18
62C0- 08 2D 0C 24 00 FF 3B BF
62C8- 36 36 0E 2D 25 04 24 FC
62D0- 92 0E 04 00 FF 3B 3F 36
62D8- 36 36 4D E1 1C 07 28 65
62E0- 24 00 00 E2 3F 17 0E 0E
62E8- 0E 0E 1E 3F 07 20 00 00
62F0- 3F 3F 4E 36 36 36 00 00
62F8- 36 36 F6 3F 1C 24 24 24
6300- 00 FF 36 36 1E 1E 1C 1C
6308- 24 24 04 00 FF 36 36 36
6310- 1C C4 F6 1E 24 24 24 04
6318- 00 FF F6 1E 1C 1C B4 92
6320- 22 0C 0D 15 36 00 00 36
6328- E3 C3 76 0E 36 36 00 00
6330- 1B 1B 2D 2D 36 33 33 33
6338- 33 2D 2D 05 00 FF 1B 1B
6340- 12 0C 0C 36 36 36 1B 2D
6348- 2D 05 00 00 3B 3F 6A 09
6350- F6 F7 17 2E 2D 2D 00 00
6358- 3B 3F 6A 09 F6 2B 15 F6
6360- 3F 1C 05 00 FF DB 33 36
6368- 2D 2D 1C 30 36 36 06 00
6370- FF 3F 3F 36 2E 2D 15 F6
6378- 3F 3F 00 00 3F 17 17 36
6380- 76 2D 0C E4 3F 07 00 00
6388- DB 2B 2D 35 1E 1E 1E 36
6390- 06 00 00 92 12 24 DB 2D
6398- 0C E4 3F 17 36 32 0E 2D
63A0- 05 00 00 92 E2 1B 2D 25
63A8- E4 3F 17 B6 12 2D 0C 04
63B0- 00 FF 3B 3F 32 36 76 2D
63B8- 0C 24 24 1E 1E 1E 06 00
63C0- FF F6 16 00 FF 06 00 F0
63C8- 03
*
```

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Upgrading Your Spreadsheet: Getting AppleWorks and THE Spreadsheet to Behave—Part 1

Jeffrey M. Jacques

Over the past several months I have received many calls from A.P.P.L.E. Co-op members about how to get AppleWorks to behave as other spreadsheets—e.g., How do you get logical functions when you have no @AND or @OR function? How do you round off a value when you have no @ROUND function? How do you check for an @NA, NOT AVAILABLE, when @ISNA is not available?

At the same time, I have also gotten calls which explored how our members could get THE Spreadsheet to: (1) use business functions available elsewhere; (2) work with macros (i.e., simple little programs that tell spreadsheet software what to do without having to press the keyboard); and, finally, (3) sort a column of values. After all, third generation spreadsheets (i.e., SuperCalc 3, Lotus 1-2-3, etc.) execute all these functions and commands, Why can't AppleWorks and THE Spreadsheet?

Well, *can't* is a little strong. In fact, AppleWorks and THE Spreadsheet can do most of the things third generation spreadsheets can do, but you will have to use alternate functions, develop a series of library routines that you can easily load from your diskette to accomplish some of the missing functions, and/or use DIF files and a simple BASIC program(s) to modify the data or table. In any case, many of you have indicated an interest in continuing to work with your favorite spreadsheet software. Well, in this and following articles, we shall explore how to overcome some of the limitations noted above.

AppleWorks: What to Do about Missing Logical Functions

Several Spreadsheet functions, (i.e., @AND, @OR, @ISNA) are not available in AppleWorks. Two of these logical functions are often found in commercial templates (i.e., the logical @AND and logical @OR functions). These functions enable you to build worksheets which check on the conditions in more than one cell. Depending on the circumstances, they will return a TRUE (e.g., a value of 1), or a FALSE (e.g., a value of 0) based on all the cell values.

For example, let's say you are working with an investment template where you need to check to see if both married partners have an earned income. If both have an earned income, then you wish to compute their investments one way; while if only one partner has an earned income, you wish to have your template use a different set of equations. (Therefore, you have to build a template in which you are checking to see if both of two conditions are true.) Your template might include these cells and labels:

A	B
1 Married Couple:	Income Earning Code (1 = yes)
2 Partner #1	ENTER #
3 Partner #2	ENTER #
4 Both income earners?	@AND(B2 > 0,B3 > 0)

Income of Partner 1 would be entered in cell B2. Similarly, if Partner #2 had an income, then it would be entered in cell B3. Cell B4 would return a 1 *if and only if* both partners had incomes greater than zero. Alternately, if Partner 1 or 2 did not have an income, then cell B4 would display 0. By checking the value displayed in cell B4, your template can identify which parameters to use in making further computations.

Okay, now that you see how a logical @AND statement will work and how useful it can be, what do you do when your spreadsheet does not support the logical @AND statement? Think about it for a moment.

Here's my solution. You may have guessed it already. By placing @IF statements within other @IF statements, we can check to see if all the conditions are true. Remember that @IF statements are logical checks which give you the power to return a value if the condition is true and a different value if the condition is false. This can be expressed as:

@IF(condition, true, false)

Of course, you can place an @IF statement within another @IF statement to check on multiple conditions. It might look like this:

@IF(condition, @IF(condition,true,false), false)

In our example, therefore, the statement:

@IF(B2 0,@IF(B3< 0,1,0),0)

will return a value of 1 only when both cells, B2 and B3, have a value greater than 0. If B2 had a value of zero, then a zero would have been returned. Similarly, if B3 had a zero, then a value of zero would have been returned, too. Only when both conditions are true will a value of 1 be displayed in cell B4. Of course, if you have several cells to check with a logical AND, you can nest several @IF statements within each other to check for all conditions.

By the way, a label (e.g., ENTER #), returns a value of 0 when checked with an @IF statement. Unless you enter an income in column B, cells displaying ENTER # will continue to be treated as zero and will be evaluated appropriately without your having to enter a value of zero in these cells.

The check on a logical @OR can be simulated with an @IF statement, too. Logical @OR statements only check to see if any one of all the conditions are true. We can use the true part of the first @IF statement to check the first condition and then use the false part of the @IF statement to simulate a logical @OR. Using our example from above, the statement might look like this:

@IF(B2> 0,1,@IF(B3> 1,1,0))

If B2 is true, return a value of 1. If B2 is false, then check the value stored in cell B3. If this value is greater than 0, then return a 1, otherwise, return a 0.

Some spreadsheet software which do not support the logical OR function do support the @CHOOSE function. This function can be used to emulate the logical OR statement more easily than the nested @IF statements under certain conditions. The @CHOOSE function works like this:

@CHOOSE(condition,n1,n2,n3,. . . . . .nk)

If the value in the condition is an integer, then return the value stored in the sequence (n1 through nk) immediately after the comma. For example:

@CHOOSE(B4,1,2,1,2,22000)

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CIRCLE 19 READER SERVICE CARD

will return a value of 1 if, in cell B4, a value of 1 or 3 was stored. If cell B4 had a value of 2 or 4, then the @CHOOSE function would return a value of 2. Finally, if B4 contained a value of 5, the @CHOOSE function would return the fifth ordered value, 22000. (For those of you who have been working with my tax template, this is the best way to determine which tax schedule should be 'LOOK(ed)-UP'.) For example,

@CHOOSE(J15,@LOOKUP(T9,AN5.AN20),
@LOOKUP(T9,AQ5.AQ20). . . .)

A simple @CHOOSE statement can be an eloquent solution to most templates that require a logical @OR statement.

Finally, a logical @OR and a logical @AND can be simulated by partitioning several @IF statements to adjacent cells and then checking on the returned value of each with a @MAX or @MIN function. This is especially useful in AppleWorks since AppleWorks has a very restrictive limit on the number of characters in any cell. (We'll use this procedure a little later. So read on OR look at Table 1.)

AppleWorks does not support a simple @ROUND statement, i.e., an ability to simply round off a value. Since VisiCalc did not have this function either, the solution has been reported elsewhere. But since I have received so many calls about this, here it is again:

Step 1: Determine the number of places you wish to round off the value,
Step 2: Use the @INTeger function.
@INT(value)

The @INTeger function simply returns the integer value of an expression. If I wished to round off the value, 10/30 to two decimal places, then I could use the function in the expression:

@INT((10/30) * 100 + .5)/100

By adding .5 to the multiplied whole number value, I forced the spreadsheet to compute the appropriately larger value. Then, I simply took the INTeger of this new value and divided it by the same value (100) with which I multiplied it earlier. This will display .33.

You say that you wish to compute a percentage. Well, you could use the percent formating function in AppleWorks, or you could use the previous expression, slightly modified:

@INT((10/30) * 10000 + .5)/100

By multiplying by 10000 and then dividing by only 100, we have "moved" the decimal point two places and converted our display to a percentage (33.33).

I suggest that you use this expression rather than a format round-off command. If you don't, you may run into problems when you sum a series of "rounded-off" values. By the way, you could substitute a cell reference(s) for the value 10/30 (e.g., A20/A25) and automatically compute appropriate percentages in other cells. This will help when building a template. Not too tough.

The last major function I find very useful, although also unavailable in AppleWorks, is the @ISNA. I like to place @NA (not available) functions in templates until the user enters a number. I then check to make sure that all values are present with the @ISNA function and use it as part of a larger @IF statement, as in:

@IF(@ISNA(B2),0,B5 * 100)

So, if the value in cell B2 was @NA, then the @IF statement would return a value of 0. Otherwise, the value from B5*100 would be computed. While AppleWorks has an @NA function, it does not now support the @ISNA (is not available) function. The above expression, therefore, will not work.

TABLE 1 DAYS OF THE WEEK

	A	B	C	D	E
1	Jacques		Calculating	Day of the	Week
2	4/9/86				
3			Month	(E.G. Jan.=1)	5
4			Day date	(E.G. 15)	9
5			Year	(E.G. 1983)	1984
6					
7			Calculating	values for	equation:
8					
9				Day of month	9
10				N. of month	3
11				N. of yrs/100	19
12				Yr. in cent.	84
13			Calculations=		87
14					3
15			where:		
16			0 = Sunday	4 = Thursday	
17			1 = Monday	5 = Friday	Day of Week
18			2 = Tuesday	6 = Saturday	
19			3 =Wednesday	=> => => =>	3
20					

```
Equations:
>E9:@IF(E4=0,@ERROR,E4)
>E10:@IF(E3=0,@ERROR,@CHOOSE(E3,11,12,1,2,3,4,5,6,7,8,9,10))
>E11:@IF(E5=0,@ERROR,@IF(@OR(E3=1,E3=2),@INT(E5-1/100),@INT(E5/100)))
>E12:@IF(@OR(E3=1,E3=2),(E5-1/100-@INT(E5-1/100)*100),
          (E5/100-@INT(E5/100)*100))
>E13:@INT(2.6*E10-.2)+E9+E12+@INT((E12/4))+@INT((E11/4))-(2*E11)
>E14:@INT(((+E13/7)-@INT(+E13/7))*7+.5)
>E19:+E14

IF you are using a spreadsheet package which does not support logical @OR
expressions (e.g., AppleWorks), then use the following equations:

>B11:@IF(E5=0,@ERROR,@IF(E3=1,@INT(E5-1/100),-1))
>C11:@IF(E5=0,@ERROR,@IF(E3=2,@INT(E5-1/100),-1))
>D11:@IF(E5=0,@ERROR,@IF(E3>2,@INT(E5/100),-1))
>E11:@MAX(B11...D11)

>B12:@IF(E3=1,E5-1/100-@INT(E5-1/100)*100,-1)
>C12:@IF(E3=2,E5-1/100-@INT(E5-1/100)*100,-1)
>D12:@IF(E3>2,E5/100-@INT(E5/100)*100),-1)
>E12:@MAX(B12...D12)
```

If you are building a template, you may choose an extremely large or small value, a value which is unlikely to be entered into any cell, and then use the @IF expression:

@IF(B2 = -10000000,0,B5 * 100)

While we could have used any test value in cell B2, I choose an extreme value. I purposely did this for two reasons. First, in my applications, it is very unlikely that anyone would ever need to enter a value of -10,000,000. Second, and equally important in template building with AppleWorks, entering a value as extreme as this will force AppleWorks into displaying the reference cell, B2, with ########. This makes the template easier to use for the novice user since the documentation simply notes that they are to place their entries only where they see the display ########.

The Missing MOD Function

Finally, neither AppleWorks nor THE Spreadsheet support the @MOD function. The @MOD function returns a remainder of a value, such that the expression @MOD(10,7) would yield 3. The MOD function can best be thought of as the remainder when the computed value of the first part of the expression is divided by the second part.

Just as I used the @INT function to determine the appropriae @ROUNDed-off value, I, and you, can use the @INT function to find the @MOD value. Here's the expression:

@INT(((10/7)-@INT(10/7)) * 7 + .5)

and it will return the value of 3, just as the @MOD(10,7) returned the same value. (Of course, the values 10 and 7 could just as easily been cell references.) This function is useful in business equations, computing dates, etc.

Since we can simulate this function in the same way we dealt with other missing functions, I thought it useful to illustrate it with an application which handles another missing function, the DATE & DAY-OF-THE-WEEK information.

Using Zeller's Congruence (James Reagan, "Days and Dates" in *Computers in Mathematics: A Sourcebook of Ideas*, David H. Ahl, ed., Morristown, N.J.: Creative Computing Press, 1979) formula:

F = (|2.6m - 0.2| + k + d + d/4 + c/4 - 2c) mod 7

where:

k = day of the month (e.g., 1, 15, 30, etc.)
c = number of hundreds in the year (e.g., if year is 1985, then enter 19)
d = year in the century (e.g., if year is 1985, then enter 85)
m = month number (While this formula would use March as number 1, we have modified the inputed value for cell E3 so that you may enter laymen's months, e.g., January = 1, February = 2, etc.)

we may determine any day of the week.

In order to use this formula, several computations must be made from the date entered. First, the date values entered in column E are converted to appropriate values. While a legitimate value for the day of the month is simply referenced from cell E4 into E9 (i.e., @IF(E4=0,@ERROR,E4)), the number of the month (cell E3) is converted for use in the above formula in cell E10 with the expression:

```
@IF(E3=0,@ERROR,@CHOOSE
    (E3,11,12,1,2,3,4,5,6,7,8,9,10))
```

That is, what ever number of the month you enter in cell E3 is converted to the number expected by the calculation formula, cells E13 and E14. The year entered in cell E5 is then partitioned into its century in cell E11 with the expression:

```
@IF(E5=0,@ERROR,@IF(@OR(E3=1,E3=2),
    @INT(E5-1/100),@INT(E5/100)
```

and its year, in century, with the expression:

```
@IF(@OR(E3=1,E3=2),(E5-1/100-@INT(E5-1/100)*100),
    (E5/100-@INT(E5/100)*100))
```

(If you are using AppleWorks, note the suggested substitutions for these two formulae at the bottom of Table 1. Here is where we combine the use of @IF statements with the @MAX function to find the correct value. Take a minute and convince yourself that these two methods produce the same results.)

Zeller's Congruence formula translates to the THE Spreadsheet expressions in cell E13:

```
@INT(2.6 * E10-.2) + E9 + E12 + @INT((E12/4)) + @INT
    ((E11/4))-(2 * E11)
```

and E14:

```
@INT(((+E13/7)-@INT(+E13/7)) * 7 + .5)
```

The use of the @INT expressions enable us to quickly determine the value for mod 7. The value displayed in cell E14, and the value displayed again in cell E19 will always be between 0 and 6. where: 0 = Sunday, 1 = Monday, 2 = Tuesday, 3 = Wednesday, etc. Now, go ahead and try several dates by using this template. Then, make sure you see how I simulated the MOD function.

Conclusion

This has been a rather inclusive article where we have covered how to get around some of the limitations of AppleWorks and THE Spreadsheet. Next time we shall cover how to build a library of missing business functions that you can easily load into your favorite spreadsheet software. See ya then.

Snapshot and the Art of Apple II Switching

The Snapshot card unleashes your Apple's hidden power to interrupt -and-resume any running program. When you load up Snapshot's on-board RAM with one of Dark Star Systems' growing family of easy-to-use, menu-driven software packs, you get awesome switching power at the press of a button....

Switch 1 The Snapshot Shuttle is an Apple II Switcher that lets you keep up to four different programs where you can access them instantly — in your RAMcard. That means no more waiting for disk I/O. And armed with the Shuttle, you can interrupt a program and resume running it at exactly the same point, so there's no time-wasting search for where you left off. Use the Shuttle to switch among your wordprocesser, database, spreadsheet and comms programs — or *any* applications you like. The Shuttle's great for program development too. It lets you switch among operating systems, from any language to your compiler, editor, assembler or debugger — back and forth between *all* your favorite programming tools in fact.

Switch 2 The Snapshot Printerrupt lets you interrupt *any* running program, print its display using a galaxy of great menu options, and resume running it as though nothing happened. Use it to view and print both MousePaint screens; crop text and graphics; expand graphics; rotate left and right; invert and shade; print Pages 1 and 2 side-by-side, or *and, or,* and *xor* them; set dot-density; check the form position; auto-center, and adjust margins — you name it, you can do it with the Printerrupt.

Switch 3 The Snapshot Copykit lets you make archival backups of your copy-protected software. It will copy total-load programs up to 128K in less than 25 seconds, and it's invaluable for backing up multi-access programs too. The Copykit's *fast* saving and loading of total memory saves hours when you need to work with spreadsheets or other programs that take an eternity to handle large files. And the Copykit lets gamesters start the action at those hard-to-reach high levels *every* time!

Switch 4 The Shell is the memory-manager and mini operating system which allows Snapshot software to work within an interrupted program. Use it to write your own machine-code or Basic Snapshot program. It could be a great debugger, a comms program, or even a neat little game. Whatever your Apple's doing, the Shell lets you suspend it and get your program up-and-running at the press of a button.

Snapshot and its software packs are compatible with the Apple II+ and //e, all the popular 80-column cards, memory cards, printer cards, and graphics-capable dot-matrix and ink-jet printers. The system comes with 12 months warranty and free tech support, and Snapshot program disks can be upgraded inexpensively, so they need never be out-of-date.

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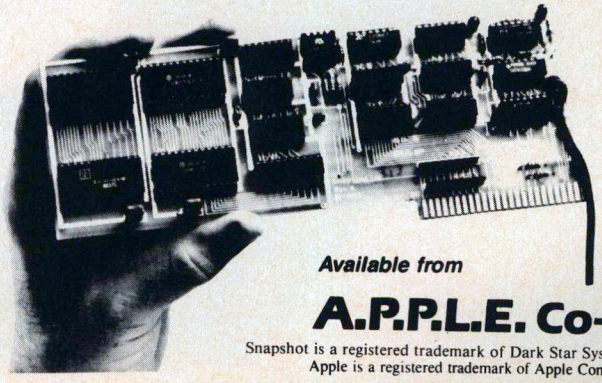

Available from

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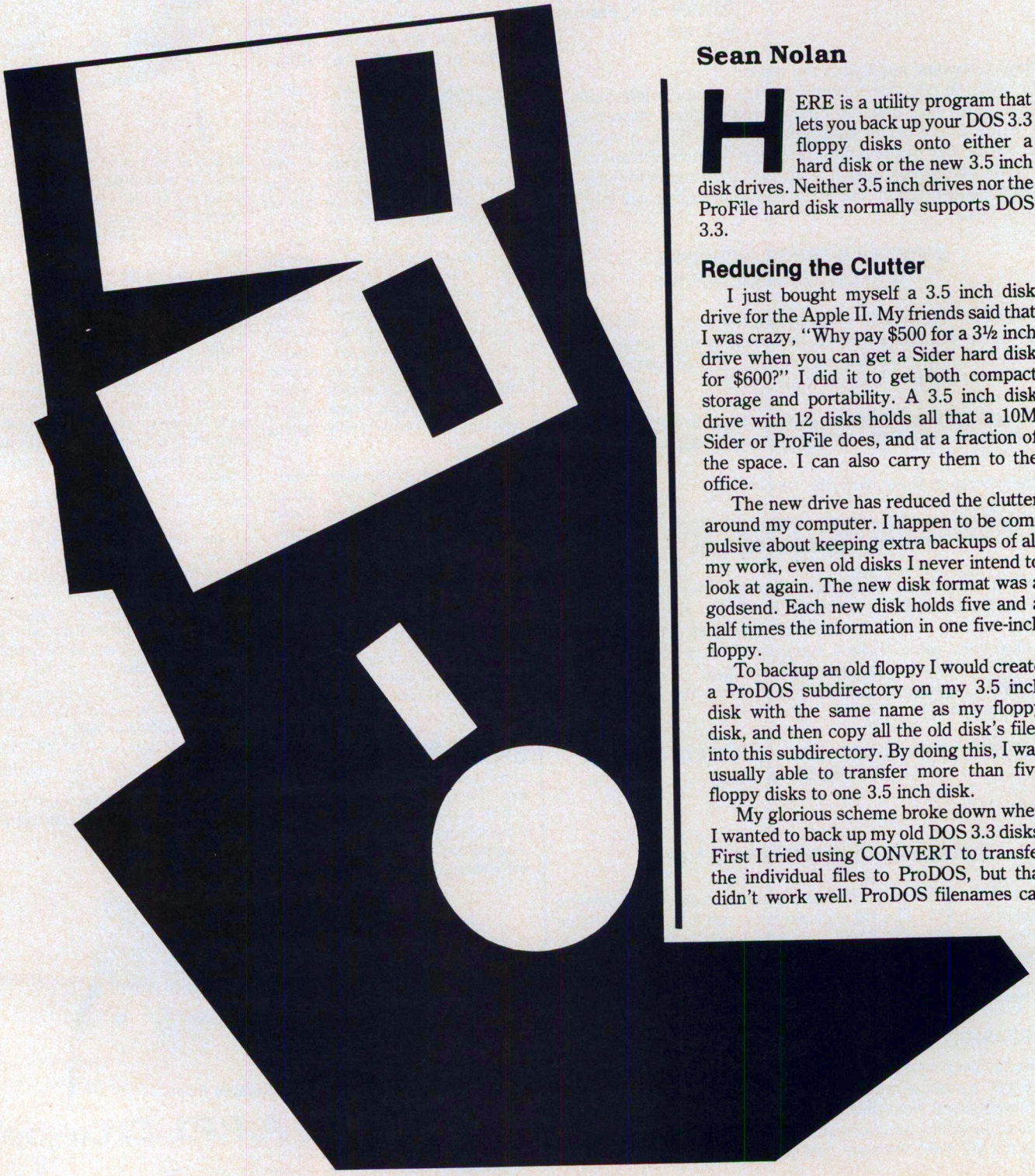
CIRCLE 15 READER SERVICE CARD

Using 3.5" Disks to Backup DOS 3.3 Floppies



Sean Nolan

HERE is a utility program that lets you back up your DOS 3.3 floppy disks onto either a hard disk or the new 3.5 inch disk drives. Neither 3.5 inch drives nor the ProFile hard disk normally supports DOS 3.3.

Reducing the Clutter

I just bought myself a 3.5 inch disk drive for the Apple II. My friends said that I was crazy, "Why pay $500 for a 3½ inch drive when you can get a Sider hard disk for $600?" I did it to get both compact storage and portability. A 3.5 inch disk drive with 12 disks holds all that a 10M Sider or ProFile does, and at a fraction of the space. I can also carry them to the office.

The new drive has reduced the clutter around my computer. I happen to be compulsive about keeping extra backups of all my work, even old disks I never intend to look at again. The new disk format was a godsend. Each new disk holds five and a half times the information in one five-inch floppy.

To backup an old floppy I would create a ProDOS subdirectory on my 3.5 inch disk with the same name as my floppy disk, and then copy all the old disk's files into this subdirectory. By doing this, I was usually able to transfer more than five floppy disks to one 3.5 inch disk.

My glorious scheme broke down when I wanted to back up my old DOS 3.3 disks. First I tried using CONVERT to transfer the individual files to ProDOS, but that didn't work well. ProDOS filenames can

only be 15 characters long, and my DOS 3.3 names were longer. My DOS names got truncated, and sometimes two DOS 3.3 filenames came out as the same ProDOS filename (bad news). In any case, converting the files back to DOS 3.3 later would not restore my original filenames.

A Utility for DOS 3.3

I therefore wrote a utility program that would let me back up DOS 3.3 disks easily. It saves an entire floppy disk into one enormous ProDOS file. DOS, Programs, Textfiles, Catalog, VTOC, it all ends up in one 283 block long ProDOS file. DOSBACKUP reads the entire disk, block by block, and writes it into one file. It does not care what is on the source disk. Although I only use it for backing up DOS 3.3 disks, it can be used to back up any 16 sector five inch floppy, whether DOS 3.3, ProDOS, PASCAL, or (maybe) CP/M.

The individual files from the DOS 3.3 disk are not accessible inside the ProDOS file. Therefore, my program is useful only for making backup copies. In order to run or list the saved DOS 3.3 programs, they first must be restored back onto a five inch floppy. That, fortunately, is easy, as my program can be used either to back up or to restore.

For Hard Disks Too

Hard disk owners can use my program to copy floppy disks into their ProFile or Sider. The steps are the same:

First make sure that your target ProDOS volume (either your hard disk or a 3.5 inch disk) has at least 283 free blocks on it. Typing "CATALOG" will tell you that. Now BRUN DOSBACKUP. It will ask you for the name of the ProDOS file which the floppy will be backed-up into. Use a full ProDOS pathname (including the target disk's name), for example:

/DOSWERKE/DOS.DISK.NO1

Then press "B" to backup and put your source disk in your 5¼ inch disk drive, drive 1. The program will then ask you to press "C" to continue or any other key to cancel. Backing up should take less than a minute and a half.

Restoring disks from ProDOS files to disks of their own uses the same program. You use the command "R" to restore. Your target floppy must be formatted already, as my program doesn't format.

Warning! Usually a ProDOS-formatted floppy will do as a target disk, but sometimes not. In order for your restored DOS 3.3 floppy to boot, the target disk must have been formatted with the same volume number as your original DOS 3.3 disk which you have backed up. I suggest that you play it safe and INIT all target floppies using your DOS 3.3 SYSTEM MASTER. If your original DOS 3.3 disk has an oddball volume number (anything other than 254), be sure to INIT your target blank floppy with the same number. If there is a mismatch between the volume number stored in DOS and the volume number in the address fields of the target floppy, the restored DOS 3.3 disk will never boot.

It is also important that you save the DOSBACKUP program, as you will need it if you ever want to restore your backed up DOS 3.3 files. Since a 3.5 inch disk with five 283-block type $00 files has 178 free blocks, you can include PRODOS, BASIC.SYSTEM, and DOSBACKUP on every 3.5 inch archive disk.

The technique of backing up ProDOS volumes within a single ProDOS file is a useful one. With minor modifications, the program below could be altered to back up 3.5 inch disks onto a hard disk. Additional changes can turn DOSBACKUP into a ramdisk backup/restore utility.

The listing below was created using the MERLIN.PRO assembler.

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- 8 channels D/A
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- Manual contains sample applications

A/D SPECIFICATIONS

- 0.3% accuracy
- On-board memory
- Fast conversion (.078 MS per channel)
- A/D process totally transparent to Apple (looks like memory)
- User programmable input ranges are 0 to 10 volts, 0 to 5, −5 to +5, −2.5 to +2.5, −5 to 0, −10 to 0.

The A/D process takes place on a continuous, channel sequencing basis. Data is automatically transferred to its proper location in the on-board RAM. No A/D converter could be easier to use.

D/A SPECIFICATIONS

- 0.3% accuracy
- On-board memory
- On-board output buffer amps can drive 5 MA
- D/A process is totally transparent to the Apple (just poke the data)
- Fast conversion (.003 MS per channel)
- User programmable output ranges are 0 to 5 volts and 0 to 10 volts

The D/A section contains 8 digital to analog converters, with output buffer amplifiers and all interface logic on a single card. On-card latches are provided for each of the eight D/A converters. No D/A converter could be easier to use. The on-board amplifiers are laser-trimmed during manufacture, thereby eliminating any requirement for off-set nulling.

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Our 8 channel signal conditioner is designed for use with both our A/D converters. This board incorporates 8 F.E.T. op-amps, which allow almost any gain or offset. For example, an input signal that varies from 2.00 to 2.15 volts or a signal that varies from 0 to 50 mV can easily be converted to 0-10V output for the A/D.

The signal conditioner's outputs are on a high quality 16 pin gold I.C. socket that matches the one on the A/D's so a simple ribbon cable connects the two. The signal conditioner can be powered by your Apple or from an external supply.

FEATURES

- 4.5" square for standard card cage and 4 mounting holes for standard mounting. The signal conditioner does not plug into the Apple, it can be located up to ½ mile away from the A/D.
- 22 pin .156 spacing edge card input connector (extra connectors are easily available i.e. Radio Shack).
- Large bread board area.
- Full detailed schematic included.

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- Provides 4, 8-Bit programmable I/O Ports
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The I/O manual includes many programs for inputs and outputs.

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CIRCLE **2** READER SERVICE CARD

The listing below was created using the MERLIN.PRO assembler.

```
1   ********************************
2   *                              *
3   *    DOS 3.3 disk backup       *
4   *                              *
5   * Copyright 1986 by Sean Nolan *
6   *                              *
7   *     Copies an entire 5.25"   *
8   *  disk into a single ProDOS   *
9   *  file of type $00.           *
10  *                              *
11  ********************************
12
13
14          ORG   $2000
15
16
17  PROMPT  =     $33
18  SPSAVE  =     $FF
19
20  PROBUFFER =   $3000     1K ProDOS I/O Buffer
21  DOSBUFFER =   $3400     buffer to read blocks into
22  PRONAME =     $3600     Name of ProDOS file goes here
23
24  BASIC   =     $BE00
25  PRINTERR =    $BE0C     Prints error message based on
26                          ;BASIC.SYSTEM error code.
27  BADCALL =     $BE8B     converts MLI error code to a
28                          ;BASIC.SYSTEM one.
29  MLI     =     $BF00     ProDOS MLI entry point
30  DEVCNT  =     $BF31     Number of disk devices
31  DEVLST  =     $BF32     List of disk devices
32
33  KEYBOARD =    $C000
34  KEYSTROBE =   $C010
35
36  IDBYTE  =     $FBB3     identifies an Apple II+
37  HOME    =     $FC58
38  GETLN   =     $FD6A     Input a line
39  COUT1   =     $FDF0     Print a character
40
41
42  ******************************** look for a disk // drive
43
44
2000: A2 00     45  START   LDX   #0        search for highest slot
2002: BD 32 BF  46  ]loop   LDA   DEVLST,X  disk // drive
2005: 2C 15 20  47          BIT   :0F
2008: F0 0C     48          BEQ   :found
200A: E8        49          INX
200B: EC 31 BF  50          CPX   DEVCNT
200E: 90 F2     51          BCC   ]loop
2010: F0 F0     52          BEQ   ]loop
                53                        ;exit if no disk // found
2012: 4C 00 BE  54  ]end    JMP   BASIC
2015: 0F        55  :0F     HEX   0F
                56
2016: 29 70     57  :found  AND   #$70     force drive 1
2018: 8D 92 22  58          STA   DOSDEVNUM save device number to read
201B: 4A        59          LSR           ;blocks from
201C: 4A        60          LSR
201D: 4A        61          LSR           ;convert to slot number
201E: 4A        62          LSR           ;for screen message.
201F: 09 B0     63          ORA   #"0"    convert to ascii
2021: 8D 37 22  64          STA   SLOT
                65
2024: BA        66          TSX
2025: 86 FF     67          STX   SPSAVE
                68
                69
                70  ******************************** Main Menu
```


UniDOS 3.3
For the Apple UniDisk 3.5

Apple's new 800K UniDisk drive gives you five times the storage capacity of floppy disks — but no DOS 3.3. Now you can have it — with UniDOS 3.3!

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The UniDOS 3.3 facts:

- Two 400K volumes per disk.
- Supports one or two UniDisk 3.5's, addressable as Drives 1-4.
- Up to 217 Catalog names per disk.
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- Uses only 1K of user memory.
- Developer licenses are available.
- For the Apple II Plus, //e and //c

* Note: Full compatibility with Applesoft programs. However, UniDOS 3.3 may not operate correctly with machine language utility programs that directly use DOS 3.3 internal routines. Apple and UniDisk 3.5 are registered trademarks of Apple Computer, Inc.

CIRCLE 21 READER SERVICE CARD

What the Experts are Saying About RamWorks II!®

"In an informal competition called '640K vs. 640K' AppleWorks running on a RamWorks equipped Apple IIe outperformed Symphony running on an IBM PC."

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—*A+ Magazine*

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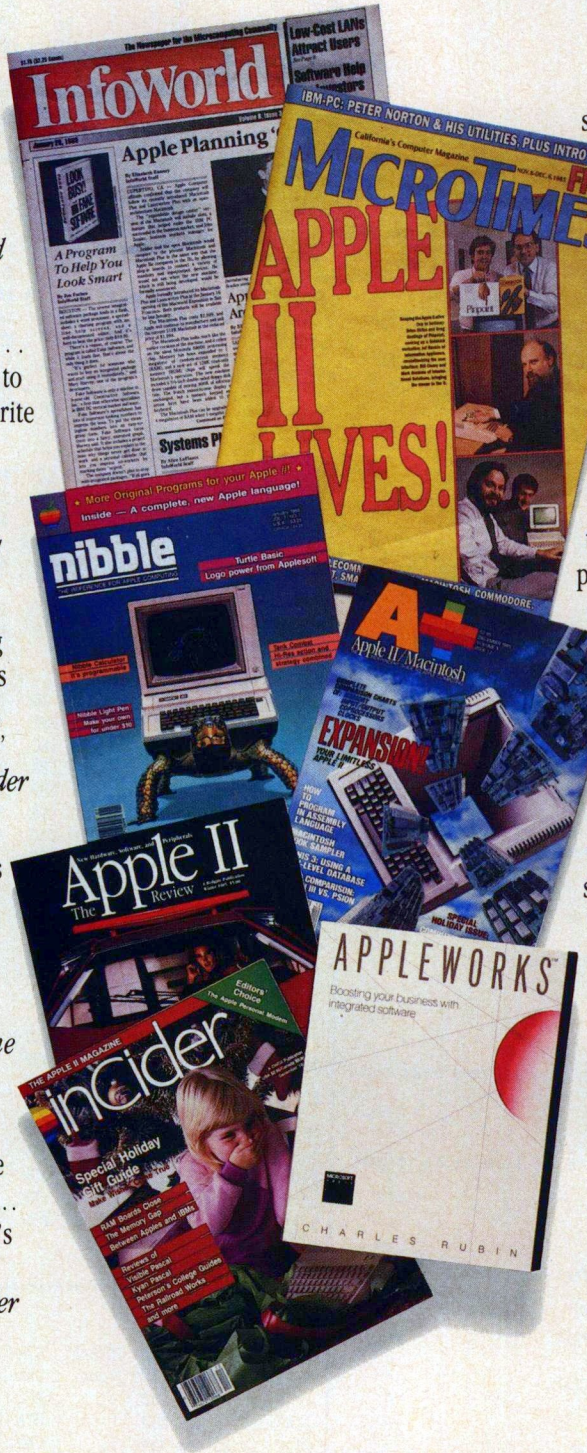

As you can see, it's easy to tell who sets the pace in Apple memory expansion. In fact, if you read the competition's ads, you'll notice that many even claim to be as good as RamWorks. Some say they're "RamWorks compatible". At least they agree on one thing. RamWorks is the one they have to measure up to. But the truth is there aren't any substitutes for RamWorks.

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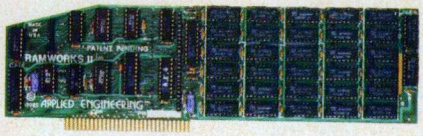

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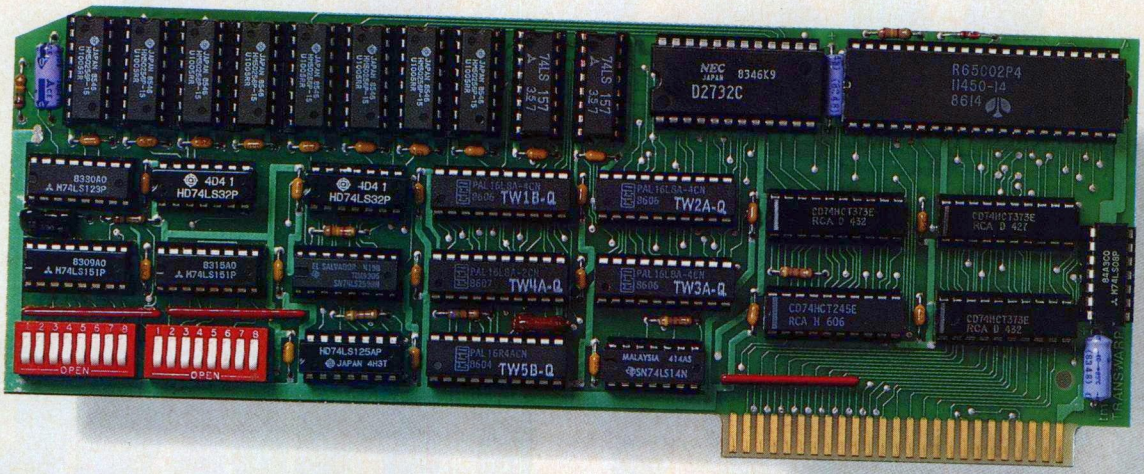
CIRCLE 3 READER SERVICE CARD

```
                        71
                        72
2027: A6 FF     73  RESTART  LDX   SPSAVE
2029: 9A        74           TXS
202A: 20 58 FC  75           JSR   HOME
202D: A2 00     76           LDX   #BOOTTEXT-BOOTTEXT
202F: 20 53 21  77           JSR   PRINT
2032: A2 27     78           LDX   #39
2034: A9 DF     79           LDA   #"_"
2036: 20 F0 FD  80  ]loop    JSR   COUT1
2039: CA        81           DEX
203A: 10 FA     82           BPL   ]loop
203C: A2 2A     83           LDX   #MENUTEXT-BOOTTEXT
203E: 20 53 21  84           JSR   PRINT
                85
2041: 20 41 21  86  ]loop    JSR   GETAKEY
2044: C9 C5     87           CMP   #"E"
2046: F0 CA     88           BEQ   ]end
2048: C9 C2     89           CMP   #"B"
204A: D0 06     90           BNE   :a
204C: 20 5C 20  91           JSR   BACKUP
204F: 4C 27 20  92           JMP   RESTART
                93
2052: C9 D2     94  :a       CMP   #"R"
2054: D0 EB     95           BNE   ]loop
2056: 20 AE 20  96           JSR   RESTORE
2059: 4C 27 20  97           JMP   RESTART
                98
                99
               100  ******************************** Backup disk
               101
               102
205C: A2 59    103  BACKUP   LDX   #PROMPT1-BOOTTEXT
205E: 20 53 21 104           JSR   PRINT
2061: A2 69    105           LDX   #PROMPT2-BOOTTEXT
2063: 20 53 21 106           JSR   PRINT
2066: 20 6A 21 107           JSR   GETNAME
2069: A2 86    108           LDX   #WARN1-BOOTTEXT
206B: 20 53 21 109           JSR   PRINT
206E: A2 93    110           LDX   #WARN2-BOOTTEXT
2070: 20 53 21 111           JSR   PRINT
2073: A2 A0    112           LDX   #WARN4-BOOTTEXT
2075: 20 53 21 113           JSR   PRINT
2078: 20 7E 21 114           JSR   GETC
               115
207B: 20 00 BF 116           JSR   MLI         see if ProDOS file exists
207E: C4       117           HEX   C4
207F: 6D 22    118           DA    GETINFOp
               119
2081: C9 46    120           CMP   #$46        if file not found, go create it
2083: F0 0F    121           BEQ   :create
2085: C9 01    122           CMP   #1          set carry if error
2087: 20 2A 21 123           JSR   ERROR?      any other error is fatal
208A: AD 71 22 124           LDA   GETtype     make sure it's a type $00
208D: F0 0E    125           BEQ   :ok
208F: A9 4B    126           LDA   #$4B        fake 'INVALID STORAGE TYPE'
2091: 4C 2C 21 127           JMP   ERROR       ;error if it's not type $00
               128
2094: 20 00 BF 129  :create  JSR   MLI         CREATE the file
2097: C0       130           HEX   C0
2098: 7F 22    131           DA    CREATEp
209A: 20 2A 21 132           JSR   ERROR?
               133
209D: 20 D9 20 134  :ok      JSR   OPEN        open file and zero block number
               135
20A0: 20 EF 20 136  ]loop    JSR   READBLOCK
20A3: 20 00 21 137           JSR   WRITEFILE
20A6: 20 11 21 138           JSR   NEXTBLOCK   inc's BLOCK and tests if done
20A9: 90 F5    139           BCC   ]loop
20AB: 4C 24 21 140           JMP   CLOSE
               141
               142
               143  ******************************** Restore disk
               144
               145
20AE: A2 59    146  RESTORE  LDX   #PROMPT1-BOOTTEXT
20B0: 20 53 21 147           JSR   PRINT
20B3: A2 77    148           LDX   #PROMPT3-BOOTTEXT
20B5: 20 53 21 149           JSR   PRINT
20B8: 20 6A 21 150           JSR   GETNAME
20BB: A2 86    151           LDX   #WARN1-BOOTTEXT
20BD: 20 53 21 152           JSR   PRINT
20C0: A2 9A    153           LDX   #WARN3-BOOTTEXT
20C2: 20 53 21 154           JSR   PRINT
20C5: 20 7E 21 155           JSR   GETC
               156
20C8: 20 D9 20 157           JSR   OPEN        open file and zero block number
               158
20CB: 20 03 21 159  ]loop    JSR   READFILE
20CE: 20 F2 20 160           JSR   WRITEBLOCK
20D1: 20 11 21 161           JSR   NEXTBLOCK   inc's BLOCK and tests if done
20D4: 90 F5    162           BCC   ]loop
20D6: 4C 24 21 163           JMP   CLOSE
               164
               165
               166  ******************************** Common to Restore/Backup
               167
               168
20D9: 20 00 BF 169  OPEN     JSR   MLI         open the ProDOS file
20DC: C8       170           HEX   C8
20DD: 8B 22    171           DA    OPENp
20DF: 20 2A 21 172           JSR   ERROR?
               173
20E2: 8D 95 22 174           STA   BLOCK       zero block number (A=0)
20E5: 8D 96 22 175           STA   BLOCK+1
20E8: AD 90 22 176           LDA   OPENn
20EB: 8D 98 22 177           STA   RWn
20EE: 60       178           RTS
               179
               180
20EF: A9 80    181  READBLOCK LDA  #$80        MLI command num for read block
20F1: 2C       182            HEX  2C
20F2: A9 81    183  WRITEBLOCK LDA #$81        MLI command num for write block
20F4: 8D FA 20 184            STA  :a
20F7: 20 00 BF 185            JSR  MLI
20FA: 00       186  :a         BRK             ; command number self-modified
20FB: 91 22    187             DA   BLOCKp
20FD: 4C 2A 21 188             JMP  ERROR?
               189
               190
2100: A9 CB    191  WRITEFILE LDA  #$CB        write MLI command
2102: 2C       192            HEX  2C
2103: A9 CA    193  READFILE LDA  #$CA
2105: 8D 0B 21 194            STA  :a
2108: 20 00 BF 195            JSR  MLI
210B: 00       196  :a         BRK             ; command number self-modified
210C: 97 22    197             DA   RWp
210E: 4C 2A 21 198             JMP  ERROR?
               199
               200
2111: EE 95 22 201  NEXTBLOCK INC  BLOCK
2114: D0 03    202            BNE  :a
2116: EE 96 22 203            INC  BLOCK+1
2119: AD 95 22 204  :a        LDA  BLOCK       test if block = 280
211C: C9 18    205            CMP  #<280
211E: AD 96 22 206            LDA  BLOCK+1
2121: E9 01    207            SBC  #>280       carry set if last block done
2123: 60       208  :rts      RTS
               209
               210
2124: 20 00 BF 211  CLOSE    JSR   MLI
2127: CC       212           HEX   CC          close
2128: 9F 22    213           DA    CLOSEp
               214
               215
212A: 90 14    216  ERROR?   BCC   NOERROR
212C: 20 8B BE 217  ERROR    JSR   BADCALL     translate to BASIC.SYSTEM
212F: 20 0C BE 218           JSR   PRINTERR    error code & print message
2132: A2 D4    219           LDX   #ERRTEXT-BOOTTEXT
2134: 20 53 21 220           JSR   PRINT
2137: 20 24 21 221           JSR   CLOSE       close all files!
213A: 20 41 21 222           JSR   GETAKEY
213D: 4C 27 20 223           JMP   RESTART
2140: 60       224  NOERROR  RTS
               225
               226
               227  ******************************** I/O routines
               228
               229
2141: 8D 10 C0 230  GETAKEY  STA   KEYSTROBE   eat early keypresses
2144: AD 00 C0 231  ]loop    LDA   KEYBOARD
2147: 10 FB    232           BPL   ]loop
2149: 8D 10 C0 233           STA   KEYSTROBE
214C: C9 E0    234           CMP   #$E0        map lc -> uc
214E: 90 02    235           BLT   :rts
2150: E9 20    236           SBC   #$20        (carry always set)
```

To boldly go at speeds no Apple has gone before.



Get TransWarp.™ The fastest accelerator you can buy for your Apple™ IIe, II, or II+.

Computing at warp speed!

It's an experience you shouldn't miss. And with TransWarp, you won't have to. Because TransWarp will run your software up to *3.6 times faster* — leaving other accelerators in the stardust!

No more waiting while your Apple™ slowly rearranges text or calculates spreadsheets. With 256K of ultra-fast RAM, TransWarp speeds up *all* Apple software — including AppleWorks, SuperCalc 3a, VisiCalc, and all educational software, graphics and games. And it's compatible with all standard peripheral cards (such as RamWorks and Apple memory cards), Profile and Sider hard disks, 3½" UniDisks, 80-column cards, modems, clock cards, mouses and more! You name it, TransWarp accelerates it. There's even a 16 bit upgrade chip available should 16 bit software become available for the Apple.

An important difference.

TransWarp's not the only speedup card on the market. But it's the only one that accelerates your Apple's main memory, ROM *and auxiliary memory.* And with more and more programs residing in auxiliary memory, buying anyone else's accelerator makes less and less sense because TransWarp speeds up software up to 3 times faster than other cards on the market because the others can't accelerate programs in auxiliary memory. That's why TransWarp is so much faster than the rest. Nearly all of today's more powerful programs run partially or completely in auxiliary memory; programs like AppleWorks, Pinpoint, Managing Your Money, SuperCalc 3a, BPI and Pascal, just to name a few. Why settle for a card that only accelerates part of memory? Get TransWarp, it accelerates all memory. TransWarp even works with most D.M.A. devices including the Swyft™ card.

There's one more difference. Since TransWarp doesn't use memory caching, you get consistent high speed performance.

A cinch to use.

Simply plug TransWarp into any slot in your Apple II, II+ or IIe —including slot 3 in the IIe. Instantly you'll be computing at speeds you only dreamed about before. And should you ever wish to run at normal speed, simply press the ESC key while turning your Apple on.

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Imagine the productivity gains you'll achieve when your programs are running over three times faster. TransWarp is so powerful, your Apple will make IBM PCs™ and even ATs™ look like slowpokes — whether you're planning taxes, plotting charts or playing games! Take a look at a few of the features that set TransWarp apart:

- 3.6 MHZ 65C02
- 256K of ultra-fast on-board RAM
- Accelerates main *and* auxiliary memory
- Low power consumption for cool operation
- Totally transparent operation with all software
- Plugs into any slot, including slot 3 on the Apple IIe
- Accelerated 16 bit option available
- Can run at full acceleration, half acceleration or normal Apple speed
- 5 year warranty

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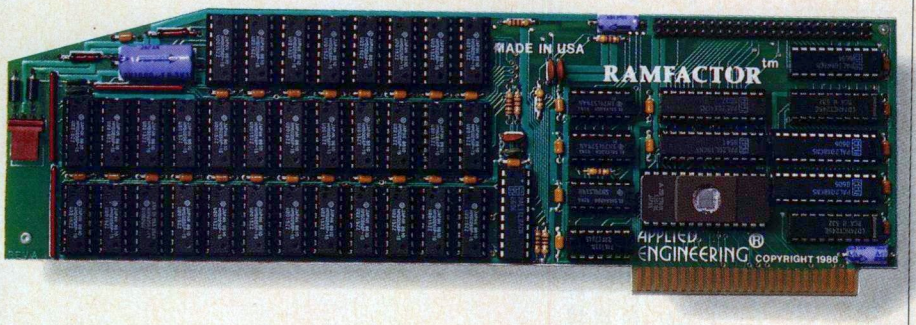
With RamFactor, you'll be able to instantly add another 256K, 512K, or a full 1 meg on the main board and up to 16 meg with additional piggyback card. And since virtually all software is automatically compatible with RamFactor, you'll immediately be able to load programs into RamFactor for instantaneous access to information. You'll also be able to store more data for larger word processing documents, bigger data bases, and expanded spreadsheets.



Very Compatible

All the leading software is already compatible with RamFactor. Programs like AppleWorks, Pinpoint, BPI, Managing Your Money, Dollars and Sense, SuperCalc 3A, PFS, MouseWrite, MouseDesk, MouseCalc, Sensible Speller, Applewriter IIe, Business Works, ReportWorks, Catalyst 3.0 and more. And RamFactor is fully ProDos, DOS 3.3, Pascal 1.3 and CP/M compatible. In fact, no other memory card (RamWorks excepted) is more compatible with commercial software.

AppleWorks Power

There are other slot 1-7 cards that give AppleWorks a larger desktop, but that's the end of their story. But RamFactor is the only slot 1-7 card that increases AppleWorks internal memory limits, increasing the maximum number of records in the database and lines permitted in the word processor, and RamFactor is the only standard slot card that will automatically load AppleWorks into RAM dramatically increasing speed and eliminating the time required to access the program disk, it will even display the time and date on the AppleWorks screen with any ProDos clock. RamFactor will automatically segment large files so they can be saved on 5¼", 3½", and hard disks. All this performance is available to anyone with an Apple IIe *or* II+ with an 80 column card. RamFactor, no other standard slot card comes close to enhancing AppleWorks so much.

True 65C816 16 Bit Power

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With RamFactor, you can organize memory into multiple work areas and switch between them. Each work area can contain different programs and even different operating systems. Now you can switch from one program to another or even switch from AppleWorks to DOS 3.3 to CP/M to Pascal to ProDos in under a second. And with our Battery back-up option, you can have permanent storage for up to 20 years.

Quality and Support of the Industry Leader

RamFactor is from Applied Engineering, the largest, most well supported manufacturer of Apple peripherals and the inventor of large RAM cards for the Apple. With our 5 year no hassle warranty and outstanding technical support, you're assured of the most trouble free product you can buy.

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- Built-in RamDrive™ software (a true RAM disk not disk caching)
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- Built-in linear addressing 16 bit co-processor port
- Built-in self diagnostic software
- Automatic expansion with AppleWorks 1.3 or later
- Allows Apple II+ and IIe to run your AppleWorks without buying additional software
- Accelerates AppleWorks
- Displays time and date on the AppleWorks screen with any ProDos clock
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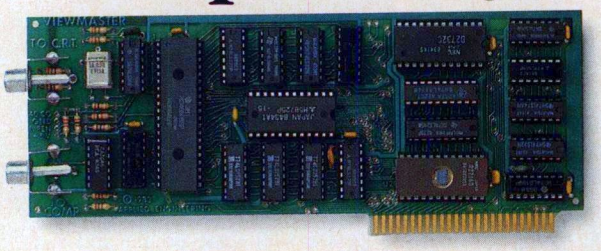

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SUPRTERM		√					√	√	
WIZARD 80					√		√	√	
VISION 80	√	√			√				
OMNIVISION		√					√	√	
VIEWMAX 80	√	√			√			√	
SMARTERM	√	√				√	√		
VIDEOTERM		√	√		√	√		√	

One look at the chart will give you some of the reasons there's only one smart choice in 80 column cards for your Apple. But the real secret to Viewmaster 80's success is something even better: Total compatibility.

Each Viewmaster 80 includes our powerful AppleWorks expand software, allowing AppleWorks to run on the II+ with only 64K (or more) memory. (We recommend the RamFactor memory card, but any compatible Apple memory card will work.) The software provides our full range of AppleWorks enhancements, including expanded records, word processor, multi-disk saving, time and date display on screen with any PRO-DOS clock, and more!

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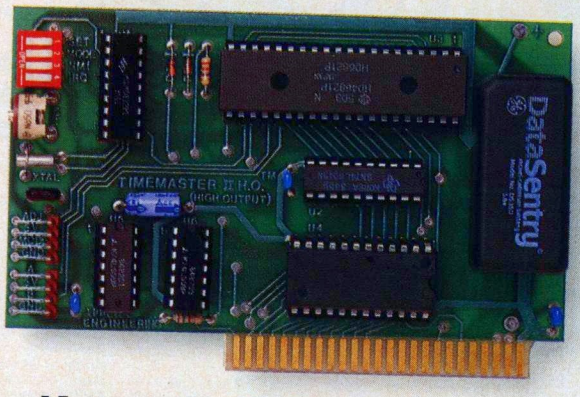
CIRCLE 6 READER SERVICE CARD

```
2152: 60        237  :rts    RTS
                238
                239
2153: BD 89 21  240  PRINT   LDA   BOOTTEXT,X
2156: F0 11     241          BEQ   :rts
2158: 2C B3 FB  242          BIT   IDBYTE     if running on a II+,
215B: 10 06     243          BPL   :ok        change all lower case
215D: C9 E1     244          CMP   #"a"       letters to upper case.
215F: 90 02     245          BCC   :ok
2161: E9 20     246          SBC   #$20
2163: 20 F0 FD  247  :ok     JSR   COUT1
2166: E8        248          INX
2167: D0 EA     249          BNE   PRINT
2169: 60        250  :rts    RTS
                251
                252
216A: A9 8D     253  GETNAME LDA   #$8D
216C: 85 33     254          STA   PROMPT     get ProDOS filename
216E: 20 6A FD  255          JSR   GETLN
2171: 8E 00 36  256          STX   PRONAME    X=length
2174: BD 00 02  257  ]loop   LDA   $200,X     copy name up for safe-keeping
2177: 9D 01 36  258          STA   PRONAME+1,X
217A: CA        259          DEX
217B: 10 F7     260          BPL   ]loop
217D: 60        261          RTS
                262
                263
217E: 20 41 21  264  GETC    JSR   GETAKEY    wait for keypress.
2181: C9 C3     265          CMP   #"C"
2183: F0 03     266          BEQ   :rts
2185: 4C 27 20  267          JMP   RESTART    if not "C", RESTART
2188: 60        268  :rts    RTS
                269
                270
                271  ********************************* Text
                272
                273
2189: C2 E1 E3  274  BOOTTEXT ASC   !Backup/Restore 5" floppy in ProDOS file !
218C: EB F5 F0
218F: AF D2 E5
2192: F3 F4 EF
2195: F2 E5 A0
2198: B5 A2 A0
219B: E6 EC EF
219E: F0 F0 F9
21A1: A0 E9 EE
21A4: A0 D0 F2
21A7: EF C4 CF
21AA: D3 A0 E6
21AD: E9 EC E5
21B0: A0
21B1: 8D 00     275          HEX   8D00
                276
21B3: 8D 8D     277  MENUTEXT HEX   8D8D
21B5: DB C2 DD  278          ASC   "[B] Backup   [R] Restore   [E] End "
21B8: A0 A0 C2
21BB: E1 E3 EB
21BE: F5 F0 A0
21C1: A0 A0 A0
21C4: DB D2 DD
21C7: A0 A0 D2
21CA: E5 F3 F4
21CD: EF F2 E5
21D0: A0 A0 A0
21D3: A0 DB C5
21D6: DD A0 A0
21D9: C5 EE E4
21DC: A0
21DD: 8D 8D 8D  279          HEX   8D8D8D8D00
21E0: 8D 00
                280
21E2: D0 F2 EF  281  PROMPT1  ASC   "ProDOS file to "00
21E5: C4 CF D3
21E8: A0 E6 E9
21EB: EC E5 A0
21EE: F4 EF A0
21F1: 00
21F2: E2 E1 E3  282  PROMPT2  ASC   "backup into ="00
21F5: EB F5 F0
21F8: A0 E9 EE
21FB: F4 EF A0
21FE: BD 00
2200: F2 E5 F3  283  PROMPT3  ASC   "restore from ="00
2203: F4 EF F2
```

```
2206: E5 A0 E6
2209: F2 EF ED
220C: A0 BD 00
                284
220F: 8D 8D 8D  285  WARN1    HEX   8D8D8D8D
2212: 8D
2213: D0 F5 F4  286           ASC   "Put the "00
2216: A0 F4 E8
2219: E5 A0 00
221C: F3 EF F5  287  WARN2    ASC   "source"00
221F: F2 E3 E5
2222: 00
2223: F4 E1 F2  288  WARN3    ASC   "target"
2226: E7 E5 F4
2229: A0 E4 E9  289  WARN4    ASC   " disk in slot "
222C: F3 EB A0
222F: E9 EE A0
2232: F3 EC EF
2235: F4 A0
2237: B6 AC A0  290  SLOT     ASC   "6, drive 1."8D
223A: E4 F2 E9
223D: F6 E5 A0
2240: B1 AE 8D
2243: D0 F2 E5  291           ASC   !Press "C" to continue.!8D8D8D00
2246: F3 F3 A0
2249: A2 C3 A2
224C: A0 F4 EF
224F: A0 E3 EF
2252: EE F4 E9
2255: EE F5 E5
2258: AE 8D 8D
225B: 8D 00
                292
225D: 8D        293  ERRTEXT  HEX   8D
225E: D0 F2 E5  294           ASC   "Press any key."00
2261: F3 F3 A0
2264: E1 EE F9
2267: A0 EB E5
226A: F9 AE 00
                295
                296
                297  ******************************** ProDOS parameter lists
                298
                299
226D: 0A        300  GETINFOp DFB   10
226E: 00 36     301           DA    PRONAME
2270: 00        302           DS    1          locked/unlocked
2271: 00        303  GETtype  DS    1          filetype
2272: 00 00 00  304           DS    13
2275: 00 00 00
2278: 00 00 00
227B: 00 00 00
227E: 00
                305
227F: 07        306  CREATEp  DFB   7
2280: 00 36     307           DA    PRONAME
2282: C3        308           HEX   C3         unlocked
2283: 00        309           HEX   00         filetype
2284: 18 01     310           DA    280        auxcode = num of blocks
2286: 01        311           HEX   01         start as a seedling file
2287: 00 00 00  312           DS    4          date/time
228A: 00
                313
228B: 03        314  OPENp    DFB   3
228C: 00 36     315           DA    PRONAME
228E: 00 30     316           DA    PROBUFFER
2290: 00        317  OPENn    DS    1          ref num
                318
2291: 03        319  BLOCKp   DFB   3          read/write block parameter list
2292: 60        320  DOSDEVNUM HEX  60         device number is modified here
2293: 00 34     321           DA    DOSBUFFER
2295: 00 00     322  BLOCK    DS    2
                323
2297: 04        324  RWp      DFB   4          read/write file parameter list
2298: 00        325  RWn      DS    1          reference number
2299: 00 34     326           DA    DOSBUFFER  read/write to/from block buffer
229B: 00 02     327           DA    $200       request $200 bytes
229D: 00 00     328           DS    2
                329
229F: 01 00     330  CLOSEp   HEX   0100       closes all files


--End assembly, 673 bytes, Errors: 0
```


Timemaster H.O.™, the only clock that displays time and date on AppleWorks'™ screens and files.



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SMART BAR

Ralph Knight

Have you noticed that the newer or more popular programs like APPLEWORKS, DOLLARS & SENSE and COPY II+ all use inverse bars in their menus? The bar is moved over the menu selections, and when it highlights the desired choice, you hit <**RETURN**> to signify your selection. This method is easy to use, fast and professional looking. If you would like to incorporate this type of menu in your own programs, the following machine language program will afford a flexible, compact method of doing so.

The SMART.BAR Program

The routine is written for the 40 column screen mode and is very fast, flexible and easy to use with Applesoft BASIC. An added bonus is that your BASIC program will need absolutely no error trapping following it's menus as this is accomplished by the routine. This will save you considerable programming time, effort and memory space. The machine language code is only 202 bytes long which allows it to fit into page three of memory with a few bytes to spare. The code is compatible with all versions of the Apple II and both DOS 3.3 and ProDOS.

The routine will find your menu anywhere on the screen and does not care how many lines of menu there are or how many characters there are in each line. To interface a routine this flexible to Applesoft, a few constraints must be observed. First, your menu must begin at screen line two or lower, and it must also have at least one blank line below the bottom menu item. Second, the left edge of the menu must be even, i.e. each line must begin in the same screen column. Third, there must be no more than one space between the words in a line and at least two (2) spaces at the end of each line. Two spaces signal the inversing routine that it has reached the end of the line. Since menus are normally centered on the screen, none of these conditions should pose any drawbacks. Lastly, your menu lines should be in upper case as the APPLE II character generator chip does not have lower case inverse screen characters. (They can be produced by an 80 column card, however.)

Using SMART.BAR

Type in the hex dump at $300 and save it with a BSAVE SMART.BAR,A$300,L$CA. Next, type in the Applesoft program and save it with a SAVE BAR.MENU.DEMO. This BASIC program illustrates the use of Smart.Bar with menus placed randomly on the screen. It first generates random numbers to be used with the HTAB, VTAB statements. Next, it places the sample menu on the screen and then calls the Smart.Bar routine. To see a demonstration, type RUN BAR.MENU.DEMO. The arrow keys will move the inverse bar, and the Return key will exit the routine with the menu line selected displayed on the screen. Another keypress will place the menu on the screen at a new location, or a "Q" may be pressed to exit the program.

To use the routine in your own programs, simply arrange the screen to your liking and define the location of the top, left character of your menu by placing HTAB, VTAB commands immediately preceding the call to the machine language. An inverse bar will instantly light up the top line of your menu. The arrow keys will scroll the bar and the Return key will signify that a selection has been made. All other keystrokes will invoke a beep, and the routine will continue to wait for a proper keypress. When the

Return key is pressed, the routine returns to BASIC with the selected "menu line number" stored in location $06. A simple PEEK(6) will reveal the choice that was made, and your program may proceed as appropriate. NOTE: The value in $06 will be the choice line from your menu, not the screen line number. For example, if your menu started on screen line 10 and the user selected the first item on the menu, the value stored at location $06 would be a one.

Liberal use of this routine will save you programming time, memory space and give your programs that professional look! Enter and enjoy.

Assembly Notes

The machine code was generated with the MERLIN assembler. Conventional opcodes were used so that the source code may be typed into most assemblers with few, if any, changes. An Origin of $300 was used for convenience, but the code could be re-assembled to any desired location in memory. The source listing is well documented and the program flow is arranged in a logical, sequential order.

The code first determines the starting location of the menu from CV (Cursor Vertical) and CH (Cursor Horizontal). These two locations ($24 and $25) will hold the starting screen line and screen column because of the HTAB, VTAB statements just prior to the "CALL" to the routine. After saving CV at TOPLINE, the routine searches for the bottom of the menu by repeatedly incrementing the screen line number, jumping to BASCALC to determine the screen memory address and taking a character sample. When a blank space is found, the bottom of the menu has been reached and that screen line number is stored at BOTTOM. Next, the top menu line is inversed, and the routine falls into a tight loop which waits for a keypress. Any key, other than the arrow keys and 'Return' key, will JSR to BELL and return to the 'Waiting' loop. Arrow keypresses are processed by first returning the currently inversed line to normal. A rollover condition (top line goes to bottom line or vice-versa) is checked for and then the appropriate line is inversed. A 'Return' keypress will branch to the 'Select' section which stores the current menu line number in location $06 and returns control to the BASIC program.

A character is easily inversed by stripping off the two high bits with an AND $3F. However, the relative positions of the alpha and numeric characters are reversed by this process. The alphabetic characters, which start out with greater values than the numeric characters, become lower values, starting at $01 for the inverse A. Therefore, different values must be added to the inversed characters to return them to their normal values. That is the reason for the test in the normalizing section of the routine. A careful look at the ASCII Screen Values in the chart on page 15 of the APPLE II Technical Reference manual will clarify this point.

Possible enhancements to this routine would be to adapt it for 80 column mode. Also, a screen address lookup table would speed things up by eliminating all the calls to BASCALC. However, either of these enhancements would make the program too long to fit on Zero page and therefore require a new running location and attendant precautions to protect it.

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CIRCLE **23** READER SERVICE CARD

LISTING 1

```
3    ********************************
4    *                              *
5    *    SMART  BAR  1  SELECTOR   *
6    *                              *
7    *..............................*
8    *    FROM: RALPH KNIGHT        *
9    *          ATL APPLE GROUP     *
10   *          THE APPLE II/IIE    *
11   *                              *
12   ********************************


14   *    WHAT IT DOES              *

16   *  THIS PROGRAM IS A  MENU SELECTOR
17   *       USING THE INVERSE BAR.
18   * THE BAR WILL AUTOMATICALLY FIND THE
19   * LINE LENGTHS AND THE NUMBER OF LINES


21   *    HOW TO USE IT

23   * JUST PRIOR TO CALLING THE M/L, DO AN HTAB,
24   * VTAB, SPECIFYING THE TOP LINE OF THE MENU
25   * AND THE LEFT MARGIN. THIS  TELLS M/L WHERE
26   * TO START FROM. USE ONLY UPPER CASE LETTERS.
27   * ( THERE ARE NO INVERSE LOWER CASE LETTERS
28   *   UNLESS YOU ARE IN 80 COLUMN MODE.)
29   * MENU SHOULD START NO HIGHER THAN SCREEN
30   * LINE 2.  USE NO MORE THAN 1 SPACE BETWEEN
31   * CHARACTERS.   2 SPACES SIGNAL THE END OF
32   * THE LINE.   CALL M/L TO GET INVERSE BAR.
33   * THE PROGRAM WILL FILTER OUT ALL BUT ARROW
34   * KEYS AND THE RETURN KEY.


36   *    **** CONSTRAINTS  ***

38   * 40 COLUMN MODE ONLY.
39   * THE MENU SHOULD HAVE AN EVEN LEFT EDGE.
40   * THE FIRST CHARACTER OF EACH LINE SHOULD
41   *  START IN THE SAME SCREEN COLUMN.
42   * THERE MUST BE A BLANK SPACE OR LINE BELOW
43   * THE LAST LINE OF MENU AND AT LEAST TWO
44   * BLANK SPACES AT THE END OF EACH MENU LINE

46             ORG  $300        ;ORIGIN GOES HERE
47             OBJ  $300        ;ASSEMBLE AT $300
48   *    *** HOOKS ***

50   RESULT    EQU  $06         ;MENU ITEM/LINE SELECTED
51   COUNT     EQU  $07         ;LINE CHARACTER COUNT
52   TOPLINE   EQU  $08         ;TOP LINE OF MENU
53   BOTTOM    EQU  $09         ;LINE JUST BELOW MENU
54   CH        EQU  $24         ;CURSOR HORIZONTAL
55   CV        EQU  $25         ;CURSOR VERTICAL
56   BASL      EQU  $28         ;TEXT BASE LOW
57   KBD       EQU  $C000       ;KEYBOARD INPUT
58   KBDSTR    EQU  $C010       ;KEYSTROBE RESET
59   BASCALC   EQU  $FBC1       ;CALC. TEXT BASE ADDRESS
60   HOME      EQU  $FC58       ;CLEAR TEXT SCREEN AND HOME CURSOR

61   BELL      EQU  $FF3A       ;OUTPUT BELL TO HOOKS

63   *          *** CONSTANTS ***

65   LEFTKY    EQU  $88         ;NEG-ASCII FOR LEFT ARROW
66   RIGHTKY   EQU  $95         ;NEG-ASCII FOR RIGHT ARROW
67   UPKY      EQU  $8B         ;NEG-ASCII FOR UP ARROW
68   DOWNKY    EQU  $8A         ;NEG-ASCII FOR DOWN ARROW
69   C         EQU  $8D         ;A CARRAIGE RETURN


71   ********************************
72   * PROGRAM     BEGINS      HERE  *
73   *  DETERMINE # OF MENU LINES    *
74   ********************************
```

```
0300: A0 00      75            LDY  #0          ;ZERO CHAR. COUNTER
0302: A6 25      76            LDX  CV          ;GET START LINE #
0304: 86 08      77            STX  TOPLINE     ;SAVE VALUE
0306: E8         78  FINDBTM   INX              ;CHECK NEXT LINE
0307: 8A         79            TXA              ;SET-UP FOR BASCALC
0308: 20 C1 FB   80            JSR  BASCALC     ;CALCULATE BASL
030B: 18         81            CLC              ;PREPARE FOR ADDITION
030C: 65 24      82            ADC  CH          ;OFFSET BY HTAB
030E: 85 28      83            STA  BASL        ;SAVE RESULT
0310: B1 28      84            LDA  (BASL),Y    ;GET CHAR ON NEXT LINE
0312: C9 A0      85            CMP  #$A0        ;IS IT A SPACE BELOW MENU
0314: D0 F0      86            BNE  FINDBTM     ;CHECK NEXT LINE
0316: 86 09      87            STX  BOTTOM      ;SAVE VALUE


                 89  ******************************
                 90  *  INVERSE TOP LINE OF MENU  *
                 91  ******************************
0318: A5 08      92  INITIAL  LDA  TOPLINE     ;SETUP FOR BASCALC
031A: 85 25      93            STA  CV          ;RESTORE CV
031C: 20 C1 FB   94            JSR  BASCALC     ;CALCULATE BASL
031F: 18         95            CLC              ;PREPARE FOR ADDITION
0320: 65 24      96            ADC  CH          ;OFFSET BY HTAB
0322: 85 28      97            STA  BASL        ;SAVE RESULT
                 99  ******************************
                100  *   INVERSE   BAR   MAKER    *
                101  ******************************
0324: A0 00     102  INVBAR   LDY  #0          ;ZERO COUNTER
0326: B1 28     103  INV1     LDA  (BASL),Y    ;PICK UP FIRST CHARACTER
0328: C9 A0     104            CMP  #$A0        ;IS IT A SPACE?
032A: D0 0A     105            BNE  INVERSE     ;CHARACTER, SO INVERSE IT
032C: C8        106            INY              ;CHECK NEXT CHARACTER
032D: B1 28     107            LDA  (BASL),Y    ;GET NEXT CHARACTER
032F: C9 A0     108            CMP  #$A0        ;IS IT ANOTHER SPACE?
0331: F0 0B     109            BEQ  DONE        ;ALL DONE WITH LINE
0333: 88        110            DEY              ;DECREMENT COUNTER
0334: B1 28     111            LDA  (BASL),Y    ;GET PREV. CHARACTER
0336: 29 3F     112  INVERSE  AND  #$3F        ;FORCE BITS 6&7 TO 0
0338: 91 28     113            STA  (BASL),Y    ;REPLACE CHARACTER
033A: C8        114            INY              ;INCREMENT COUNTER
033B: 4C 26 03  115            JMP  INV1        ;CONTINUE PROCESSING
033E: 88        116  DONE     DEY              ;# OF CHARS. IN LINE
033F: 84 07     117            STY  COUNT       ;SAVE


                119  ******************************
                120  * LOOK FOR A KEYPRESS AND    *
                121  *    FILTER UNWANTED.        *
                122  ******************************
0341: AD 00 C0  123  WAITING  LDA  KBD         ;CHECK KEYBOARD
0344: 10 FB     124            BPL  WAITING     ;LOOP UNTIL KEYPRESS
0346: 8D 10 C0  125            STA  KBDSTR      ;CLEAR KBD STROBE


                127  ******************************
                128  *   RECEIVED KEYPRESS SO NOW   *
                129  *       BEGIN PROCESSING       *
                130  ******************************
0349: C9 8A     131  PROCESS  CMP  #DOWNKY     ;WAS KEY DOWN ARROW?
034B: F0 35     132            BEQ  BARDOWN
034D: C9 95     133            CMP  #RIGHTKY    ;WAS KEY RIGHT ARROW?
034F: F0 31     134            BEQ  BARDOWN
0351: C9 8B     135            CMP  #UPKY       ;WAS KEY UP ARROW?
0353: F0 43     136            BEQ  BARUP
0355: C9 88     137            CMP  #LEFTKY     ;WAS KEY LEFT ARROW?
0357: F0 3F     138            BEQ  BARUP
0359: C9 8D     139            CMP  #C          ;WAS IT A RETURN?
035B: F0 63     140            BEQ  SELECT
035D: 20 3A FF  141            JSR  BELL        ;INVALID KEYPRESS
0360: 8D 10 C0  142            STA  KBDSTR      ;RESET KBD AGAIN
0363: 18        143            CLC              ;SET UP FORCED BRANCH
0364: 90 DB     144            BCC  WAITING     ;ALWAYS TAKEN
                146  ******************************
                147  *   SET CURRENT INVERSE BAR    *
                148  *       BACK TO NORMAL         *
                149  ******************************
0366: A0 00     150  NORMAL   LDY  #$00         ;RESET CHAR COUNTER
0368: B1 28     151  NORMLP   LDA  (BASL),Y    ;GET FIRST CHARACTER
036A: C9 1F     152            CMP  #$1F        ;> ARE NUMBERS & SYMBS
036C: B0 0A     153            BCS  NUMBERS
036E: 09 C0     154            ORA  #$C0        ;SET TO NEG. ASCII
0370: 91 28     155            STA  (BASL),Y    ;PLACE NORMAL CHAR.
0372: C8        156            INY              ;INCREMENT COUNTER
0373: C4 07     157            CPY  COUNT       ;DONE YET?
0375: 90 F1     158            BCC  NORMLP      ;CONTINUE LOOP
0377: 60        159            RTS
0378: 09 80     160  NUMBERS  ORA  #$80        ;BUMP UP TO NORMAL
037A: 91 28     161            STA  (BASL),Y    ;PLACE NORMAL CHAR.
037C: C8        162            INY              ;INCREMENT COUNTER
037D: C4 07     163            CPY  COUNT       ;DONE YET?
037F: 90 E7     164            BCC  NORMLP      ;CONTINUE LOOP
0381: 60        165            RTS


                167  ******************************
                168  *   MOVE BAR DOWN ONE LINE   *
                169  ******************************
0382: 20 66 03  170  BARDOWN  JSR  NORMAL      ;SET BAR TO NORMAL
0385: E6 25     171            INC  CV          ;INCREMENT CURSOR VERT
0387: A5 25     172            LDA  CV
0389: C5 09     173            CMP  BOTTOM      ;PAST BOTTOM OF MENU ?
038B: F0 8B     174            BEQ  INITIAL     ;START AT TOP AGAIN
038D: 20 C1 FB  175            JSR  BASCALC     ;GET NEXT LINE ADDR
0390: 18        176            CLC              ;PREPARE FOR ADDITION
0391: 65 24     177            ADC  CH          ;OFFSET BY HTAB
0393: 85 28     178            STA  BASL        ;SAVE RESULT
0395: 4C 24 03  179            JMP  INVBAR      ;MAKE INVERSE BAR


                181  ******************************
                182  *   MOVE BAR  UP  ONE LINE   *
                183  ******************************
0398: 20 66 03  184  BARUP   JSR  NORMAL      ;SET BAR TO NORMAL
039B: C6 25     185            DEC  CV          ;
039D: A5 25     186            LDA  CV
039F: C5 08     187            CMP  TOPLINE     ;PAST TOP OF MENU?
03A1: 90 0B     188            BCC  SETBTM      ;MOVE BAR TO BOTTOM
03A3: 20 C1 FB  189            JSR  BASCALC     ;GET NEXT LINE ADDR
03A6: 18        190            CLC              ;PREPARE FOR ADDITION
03A7: 65 24     191            ADC  CH          ;OFFSET BY HTAB
03A9: 85 28     192            STA  BASL        ;SAVE RESULT
03AB: 4C 24 03  193            JMP  INVBAR      ;MAKE INVERSE BAR
03AE: 38        194  SETBTM   SEC              ;PREPARE FOR SUBTRACTION
03AF: A5 09     195            LDA  BOTTOM      ;BOTTOM MENU LINE
03B1: E9 01     196            SBC  #1          ;CORRECT TO LAST LINE
03B3: 85 25     197            STA  CV
03B5: 20 C1 FB  198            JSR  BASCALC     ;GET NEXT LINE ADDR
03B8: 18        199            CLC              ;PREPARE FOR ADDITION
03B9: 65 24     200            ADC  CH          ;OFFSET BY HTAB
03BB: 85 28     201            STA  BASL        ;SAVE RESULT
03BD: 4C 24 03  202            JMP  INVBAR      ;MAKE INVERSE BAR
```


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```
                204  ******************************
                205  *   SELECTION OF MENU ITEM   *
                206  ******************************
03C0: 38        207  SELECT   SEC              ;PREPARE FOR SUBTRACTION
03C1: A5 25     208            LDA  CV          ;GET CURRENT LINE #
03C3: E5 08     209            SBC  TOPLINE     ;TO GET LINE #
03C5: 85 06     210            STA  RESULT      ;STORE RESULT
03C7: E6 06     211            INC  RESULT      ;CORRECT TO DECIMAL EQV.
03C9: 60        212            RTS              ;RETURN TO BASIC

--End assembly, 202 bytes, Errors: 0
```

```
]CALL-151

*300.3CA9

0300- A0 00 A6 25 86 08 E8 8A
0308- 20 C1 FB 18 65 24 85 28
0310- B1 28 C9 A0 D0 F0 86 09
0318- A5 08 85 25 20 C1 FB 18
0320- 65 24 85 28 A0 00 B1 28
0328- C9 A0 D0 0A C8 B1 28 C9
0330- A0 F0 0B 88 B1 28 29 3F
0338- 91 28 C8 4C 26 03 88 84
0340- 07 AD 00 C0 10 FB 8D 10
0348- C0 C9 8A F0 35 C9 95 F0
0350- 31 C9 8B F0 43 C9 88 F0
0358- 3F C9 8D F0 63 20 3A FF
0360- 8D 10 C0 18 90 DB A0 00
0368- B1 28 C9 1F B0 0A 09 C0
0370- 91 28 C8 C4 07 90 F1 60
0378- 09 80 91 28 C8 C4 07 90
0380- E7 60 20 66 03 E6 25 A5
0388- 25 C5 09 F0 8B 20 C1 FB
0390- 18 65 24 85 28 4C 24 03
0398- 20 66 03 C6 25 A5 25 C5
03A0- 08 90 0B 20 C1 FB 18 65
03A8- 24 85 28 4C 24 03 38 A5
03B0- 09 E9 01 85 25 20 C1 FB
03B8- 18 65 24 85 28 4C 24 03
03C0- 38 A5 25 E5 08 85 06 E6
03C8- 06 60
```

BAR.MENU.DEMO

```
10  REM   RANDOMLY PLACED MENU
20  PRINT : PRINT  CHR$ (4);"BLOAD SMART.BAR"
30  HOME
40 :V = 2 +  INT (14 *  RND (1)):H = 1 +  INT (18 *  RND (1))
50  VTAB V
60  HTAB H: PRINT "1 RANDOMLY PLACED MENU"
70  HTAB H: PRINT "DON'T SKIP  TWO SPACES": REM  USE TWO SPACES
    BETWEEN 'SKIP' AND 'TWO' FOR DEMONSTRATION PURPOSES
80  HTAB H: PRINT "THIRD OPTION"
90  HTAB H: PRINT "FOUR ON THE FLOOR"
100  HTAB H: PRINT "HOW ABOUT A FIFTH"
110  HTAB H: PRINT "6"
120  HTAB H: PRINT "A REAL LONG LINE 7777"
130  HTAB H: PRINT "8'TH AND LAST CHOICE"
140  VTAB V: HTAB H: CALL 768:SL =  PEEK (6)
150  VTAB (V + 9): HTAB 4: PRINT "YOU HAVE SELECTED ITEM NO. ";SL
160  PRINT "PRESS ANY KEY TO CONTINUE - Q TO QUIT ";: GET A$:
     IF A$ = "Q" THEN  END
170  GOTO 30
```

DOS Enhancer

Wesley Weber

OK, Ok now I've got this... all I have to do is load it...

BEEP! FILE TYPE MISMATCH

Stupid computer! You know what I mean! BLOAD it, blast it!

Ok, now just load the de-bugger...

BEEP! FILE NOT FOUND

Aaugh! You know that it's in the other drive! Just load it!

This is a typical situation for me. I type in a program, want to see how it works, and I leave things out when I type, like the "B" in BLOAD or the drive number.

What I needed was a modification to DOS enabling me to execute or load any type of file with a short command. In addition it should check both drives for the file, starting with the drive that is currently being used.

From these needs evolved my program, ENHANCER, which is a collection of patches to DOS 3.3. It is a small program, taking up only 119 ($77) bytes of memory and sitting between DOS and the buffers.

Entering the Programs

First, type in Listing 1 using either the monitor or an assembler and save it:

BSAVE ENHANCER, A$300, L$C0

Next, if you are using an assembler, enter Listing 2 as you normally would and save it as ENHANCER.OBJ. However, if you are not using an assembler, from BASIC type:

POKE 40192,94 :POKE 40193,156: CALL42964 RETURN

This moves the DOS buffers down so you have room for the program in a place where it can't be written over. Now enter Listing 2 with the monitor and save it:

BSAVE ENHANCER.OBJ, A$9C84, L$77

Finally, enter Listing 3 and save it:

BSAVE CMND.TABLE, A$A884, L$84

Note: when entering Listing 2 *do not* use any DOS commands until you are finished with the entire program. If you do, the commands probably won't work, and strange things may happen.

When you want to use ENHANCER, type BRUN ENHANCER. If you want ENHANCER as a permanent part of DOS, you can now INITialize a disk. The new disk will have ENHANCER automatically installed.

Enhancer Commands

With these modifications all the DOS commands that access a file check both

LISTING 1: ENHANCER

```
                 ********************************
                 *                              *
                 *            ENHANCER          *
                 *                              *
                 *       Program to load:       *
                 *       ENHANCER.OBJ and       *
                 *       CMND.TABLE then        *
                 *       sets up patchers       *
                 *      to hook everything      *
                 *            to DOS            *
                 *                              *
                 *       MERLIN assembler       *
                 *                              *
                 ********************************


                          ORG  $300


                 ********************************
                 *                              *
                 *   Set $9D00 and $9D01 to     *
                 *   38 ($26) bytes below       *
                 *   actual program start       *
                 *                              *
                 ********************************

0300: A9 5E      START    LDA  #$5E        ;38 below ENHANCER.OBJ's
0302: 8D 00 9D            STA  $9D00       ; start
0305: A9 9C               LDA  #$9C
0307: 8D 01 9D            STA  $9D01
030A: 8D 0D 9D            STA  $9D0D       ;DOS load address
030D: 20 D4 A7            JSR  $A7D4       ;build buffers
0310: A9 84               LDA  #$84        ;ENHANCER.OBJ start
0312: 8D 0C 9D            STA  $9D0C       ;DOS load address for
0315: A0 00               LDY  #$00        ; INITializing disks
0317: B9 39 03   ]LOOP    LDA  LOAD,Y
031A: F0 07               BEQ  LAM
031C: 20 ED FD            JSR  $FDED
031F: C8                  INY
0320: 4C 17 03            JMP  ]LOOP
0323: A0 00      LAM      LDY  #$00
0325: B9 61 03   ]LOOP    LDA  LAMTAB,Y
0328: F0 07               BEQ  END
032A: 99 00 02            STA  $200,Y      ;Poke 511+I, ASCII value
032D: C8                  INY
032E: 4C 25 03            JMP  ]LOOP
0331: A9 00      END      LDA  #$00
0333: 85 48               STA  $48         ;Poke 72,0
0335: 4C 70 FF            JMP  $FF70       ;Call-144
0338: 60                  RTS


0339: 8D 84      LOAD     HEX  8D84
033B: C2 CC CF            ASC  "BLOAD ENHANCER.OBJ"8D84
033E: C1 C4 A0 C5 CE C8 C1 CE
0346: C3 C5 D2 AE CF C2 CA 8D
034E: 84
034F: C2 CC CF            ASC  "BLOAD CMND.TABLE"8D00
0352: C1 C4 A0 C3 CD CE C4 AE
035A: D4 C1 C2 CC C5 8D 00


0361: B9 C4 B4   LAMTAB   ASC  "9D4A:83 9C 9F 9C N"
0364: C1 BA B8 B3 A0 B9 C3 A0
036C: B9 C6 A0 B9 C3 A0 CE
0373: C1 C2 B6            ASC  "AB61:4C C5 9C N"
0376: B1 BA B4 C3 A0 C3 B5 A0
037E: B9 C3 A0 CE
0382: C1 C2 B2            ASC  "AB22:4C BA 9C N"
0385: B2 BA B4 C3 A0 C2 C1 A0
038D: B9 C3 A0 CE
0391: C1 B9 B3            ASC  "A935:20 71 20 71 N"
0394: B5 BA B2 B0 A0 B7 B1 A0
039C: B2 B0 A0 B7 B1 A0 CE
03A3: C1 B9 B1            ASC  "A911:40 N"
03A6: B1 BA B4 B0 A0 CE
03AC: C1 B4 C6            ASC  "A4F0:4C 6E A5 N"
03AF: B0 BA B4 C3 A0 B6 C5 A0
03B7: C1 B5 A0 CE
03BB: B3 C4 B0            ASC  "3D0G"00
03BE: C7 00


--End assembly, 192 bytes, Errors: 0
```

drives for a file, starting with the current drive. If a file still is not found, you get a FILE NOT FOUND error. If a drive number is specified, only that drive is checked.

There is one exception with the DELETE command. The DELETE command only checks the current drive for the file. I added this feature to ENHANCER after accidentally DELETEing a file on the wrong drive.

You also get two commands that replace the FP and INT commands, the dash (-) and equals (=) commands. The -command executes any BASIC, binary, or text file. It also checks both drives, as described above. The = command is the same as the - command, but loads the file instead of executing it.

There is also one more command, the slash (/), which replaces the CHAIN command. This operates the same as CATALOG, but is easier to type.

If you have a program that checks to see if a file is on a disk with the VERIFY command, and you want to know which drive it was found on, use PEEK (43624). It will return with a value of 1 or 2.

How it Works

After ENHANCER is loaded, it resets the bottom address of DOS 124 bytes

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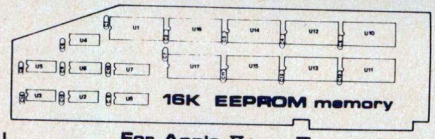

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lower, then calls $A7D4 to rebuild the buffers. Now ENHANCER.OBJ can be loaded in a safe place. Next CMND.TABLE is loaded. Finally, using the Lam routine, slightly modified, the appropiate patches to DOS are set up. The patches that ENHANCER sets up are listed in Table 1.

Also in DOS at $A884 is the Command Name Text Table, which contains the ASCII text of all the DOS commands. Every letter in a command of the table is

LISTING 2

```
                        ********************************
                        *                              *
                        *         ENHANCER.OBJ         *
                        *                              *
                        *  contains the routines for   *
                        *   the - and = commands to    *
                        *   load or execute any type   *
                        *   of file on either drive    *
                        *                              *
                        *       MERLIN assembler       *
                        *                              *
                        ********************************

                                ORG  $9C84      ;Area below DOS

                        EXEC    =    $A5C6      ;EXEC comand handler
                        BLOAD   =    $A36C      ;BLOAD command handler
                        LOAD    =    $A420      ;LOAD command handler
                        BRUN    =    $A38E      ;BRUN comand handler
                        RUN     =    $A4D1      ;RUN command handler


                        ********************************
                        *                              *
                        *          - command           *
                        *                              *
                        ********************************

9C84: 20 A8 A2          LOADIT  JSR  $A2A8      ;open the file
9C87: A9 7F                     LDA  #$7F
9C89: 2D C2 B5                  AND  $B5C2
9C8C: C9 04                     CMP  #4         ;Binary file?
9C8E: F0 0A                     BEQ  GOBIN      ;Yes
9C90: A9 23                     LDA  #$23
9C92: 2D C2 B5                  AND  $B5C2
9C95: F0 06                     BEQ  GOTEXT     ;Text file?
9C97: 4C 20 A4                  JMP  LOAD       ;No - must be BASIC
9C9A: 4C 6C A3          GOBIN   JMP  BLOAD
9C9D: 4C C6 A5          GOTEXT  JMP  EXEC


                        ********************************
                        *                              *
                        *          = command           *
                        *                              *
                        ********************************

9CA0: 20 A8 A2          RUNIT   JSR  $A2A8      ;open the file
9CA3: A9 7F                     LDA  #$7F
9CA5: 2D C2 B5                  AND  $B5C2
9CA8: C9 04                     CMP  #4         ;Binary file?
9CAA: F0 0A                     BEQ  GOBINRN    ;Yes
9CAC: A9 23                     LDA  #$23
9CAE: 2D C2 B5                  AND  $B5C2
9CB1: F0 EA                     BEQ  GOTEXT     ;Text file?
9CB3: 4C D1 A4                  JMP  RUN        ;No - must be BASIC
9CB6: 4C 8E A3          GOBINRN JMP  BRUN


                        ********************************
                        *                              *
                        *  the routine to check both   *
                        *  drives for the file starts  *
                        *          here                *
                        *                              *
                        ********************************

                        COUNTER DS   1

                        DRIVE   =    $AA68      ;Drive number
                        ODRIVE  =    $B5C0      ;Drive number used in OPEN
                        CMNDINDX =   $AA5F      ;index of command times 2
                        KEYWORDS =   $AA65      ;indicates which keywords
                                                ; are present on the command

9CBA: A9 00             RESET   LDA  #$00       ;OPEN function handler
9CBC: 8D B9 9C                  STA  COUNTER    ; jumps to here
9CBF: 20 28 AB          OPEN    JSR  $AB28      ;OPEN to take normal OPEN's
9CC2: 4C 7F B3                  JMP  $B37F      ; place since it was destroyed
                                                ; with the jump to RESET


9CC5: AD 5F AA          INCREMENT LDA  CMNDINDX  ;Get command number
9CC8: C9 0A                     CMP  #10        ;DELETE?
9CCA: F0 2C                     BEQ  ERROR      ;Yes
9CCC: AD 65 AA                  LDA  KEYWORDS   ;Get value
9CCF: 29 20                     AND  #$20       ;'D' keyword present?
9CD1: D0 25                     BNE  ERROR      ;Yes-don't check other drive
9CD3: EE B9 9C                  INC  COUNTER
9CD6: AD B9 9C                  LDA  COUNTER
9CD9: C9 02                     CMP  #$02       ;Too many times?
9CDB: F0 1B                     BEQ  ERROR      ;Yes
9CDD: EE 68 AA                  INC  DRIVE
9CE0: AD 68 AA                  LDA  DRIVE
9CE3: 8D C0 B5                  STA  ODRIVE
9CE6: C9 03                     CMP  #$03       ;Drive 3?
9CE8: F0 03                     BEQ  RESETDRV   ;Yes-set back to 1
9CEA: 4C BF 9C                  JMP  OPEN       ;OPEN the file
9CED: A9 01             RESETDRV LDA  #$01      ;Set drive back to 1
9CEF: 8D 68 AA                  STA  DRIVE
9CF2: 8D C0 B5                  STA  ODRIVE
9CF5: 4C BF 9C                  JMP  OPEN       ;OPEN the file
9CF8: 4C 73 B3          ERROR   JMP  $B373      ;FILE NOT FOUND error

--End assembly, 119 bytes, Errors: 0
```

LISTING 3

```
                        ********************************
                        *                              *
                        *         CMND.TABLE           *
                        *   Table that changes the     *
                        *     ASCII text of the        *
                        *  INT and FP commands to      *
                        *        - and =               *
                        *                              *
                        *       MERLIN assembler       *
                        *                              *
                        ********************************


                        ********************************
                        *                              *
                        * Note: The last byte of each  *
                        *       command has the high   *
                        *       bit on.  Example:      *
                        *                              *
                        *    INIT: $49 $4E $49 $D4     *
                        *                              *
                        ********************************

                                ORG  $A884      ;Start of command
                                                 table in DOS


A884: 49 4E 49                  DCI  'INIT'     ;or ASSE if using
                                                 MERLIN
A887: D4
A888: 4C 4F 41                  DCI  'LOAD'
A88B: C4
A88C: 53 41 56                  DCI  'SAVE'
A88F: C5
A890: 52 55 CE                  DCI  'RUN'
A893: AF                        DCI  '/'        ;was CHAIN
A894: 44 45 4C                  DCI  'DELETE'
A897: 45 54 C5
A89A: 4C 4F 43                  DCI  'LOCK'
A89D: CB
A89E: 55 4E 4C                  DCI  'UNLOCK'
A8A1: 4F 43 CB
A8A4: 43 4C 4F                  DCI  'CLOSE'
A8A7: 53 C5
A8A9: 52 45 41                  DCI  'READ'
A8AC: C4
A8AD: 45 58 45                  DCI  'EXEC'
A8B0: C3
A8B1: 57 52 49                  DCI  'WRITE'
A8B4: 54 C5
A8B6: 50 4F 53                  DCI  'POSITION'
A8B9: 49 54 49 4F CE
A8BE: 4F 50 45                  DCI  'OPEN'
A8C1: CE
A8C2: 41 50 50                  DCI  'APPEND'
A8C5: 45 4E C4
A8C8: 52 45 4E                  DCI  'RENAME'
A8CB: 41 4D C5
A8CE: 43 41 54                  DCI  'CATALOG'
A8D1: 41 4C 4F C7
A8D5: 4D 4F CE                  DCI  'MON'
A8D8: 4E 4F 4D                  DCI  'NOMON'
A8DB: 4F CE
A8DD: 50 52 A3                  DCI  'PR#'
A8E0: 49 4E A3                  DCI  'IN#'
A8E3: 4D 41 58                  DCI  'MAXFILES'
A8E6: 46 49 4C 45 D3
A8EB: BD                        DCI  '='        ;was FP
A8EC: AD                        DCI  '-'        ;was INT
A8ED: 42 53 41                  DCI  'BSAVE'
A8F0: 56 C5
A8F2: 42 4C 4F                  DCI  'BLOAD'
A8F5: 41 C4
A8F7: 42 52 55                  DCI  'BRUN'
A8FA: CE
A8FB: 56 45 52                  DCI  'VERIFY'
A8FE: 49 46 D9

                        ********************************
                        *                              *
                        *  If you change any commands  *
                        *   make sure you change the   *
                        *   value in line 72 so the    *
                        *    assembler saves all 132   *
                        *           bytes.             *
                        *                              *
                        *    Before I had this, when   *
                        *   I would type any command   *
                        *     that started with the    *
                        *    letter 'N' I would get a  *
                        *   NOT DIRECT COMMAND error.  *
                        *        Strange, huh?         *
                        *                              *
                        ********************************
                                DS   7

--End assembly, 132 bytes, Errors: 0
```

stored with the high bit off except for the last letter. For example, INIT would be $49 $4E $49 $D4 (I N I T). I had to change the text of FP and INT to - and =. All I did was re-write the table.

For further explanations and the patches look through chapter 8 of *Beneath Apple DOS* by Don Worth and Pieter Lechner from Quality Software. It can be bought through A.P.P.L.E. Co-op, product code PBAD. Price: $17.00.

Modifications

If you don't have two disk drives and won't be using the routine that checks both drives for the file, type from BASIC:

```
BLOAD ENHANCER
   (RETURN)
CALL -151 (RETURN)
373: A0 A0 A0 A0 A0 A0 A0
      A0 A0 A0 A0 A0 A0 A0
      A0 (RETURN)
(CTRL-C) (RETURN)
BSAVE ENHANCER A$300,
L$C0 (RETURN)
```

Some of you will dislike the - and = commands, and will want to change them to something else. You can also change any of the other DOS commands to whatever you want. Just make sure you leave the last letter of the command with the high bit on, that is, add 128 to the ASCII value of that letter. Another thing you have to remember is not to go over 132 bytes for the total length of all the words combined. If you do, you will overwrite part of DOS.

If you use Integer BASIC, you might want to leave the INT and FP commands and take two others out, or figure a way to just add two commands. Some of you also might use the CHAIN command, and want to do something else with it the same way.

If you have more that two drives, you might want to make ENHANCER check through all of the drives.

TABLE 1

9D4A:83 9C 9F 9C	Modifies the Command Handler Entry Point table ($9D1E to $9D55) so the old FP and INT (now - and =) commands jump to ENHANCER to open the file, check the type, then jump to the appropriate routine to execute the command.
AB61:4C DC 9C	Modifies the OPEN function handler (in the file manager, not the OPEN that OPENs a text file) to jump to a routine which increments the drive number if a file is not found.
AB22:4C AA AA	Modifies the same OPEN function handler to jump to a routine which resets a counter so DOS gives you a FILE NOT FOUND error after a file is not found on either drive.
A935:20 71 20 71	Modifies the Command Valid Keywords Table ($A909 to $A940) so the - and = commands except a filename, the A, D, S, and V keywords like LOAD or BLOAD. Note: if you load a BASIC file and include the A parameter with the = or - commands, the A parameter will be ignored, and you will not get an error.
A911:40	Modifies the same table so / acts like CATALOG.
A4F0:4C 6E A5	Modifies the CHAIN command handler to jump to the CATALOG command handler.

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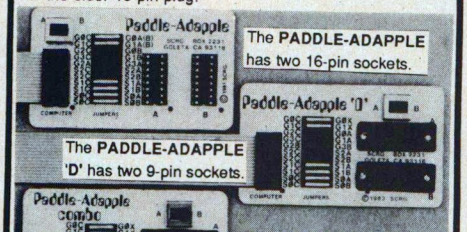
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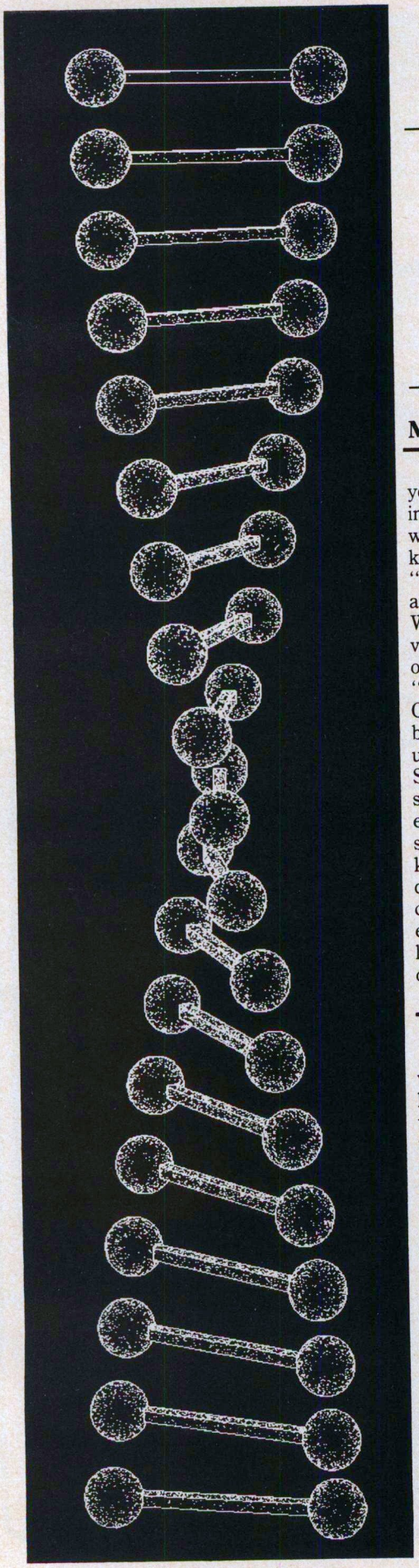

Silicon Intelligence:

Creating an Expert Assistant

Part 1

Michael and Lisa Storrie-Lombardi

We left off in our last column asking you to join us in spending some time thinking about our own domains of expertise with a basic task of outlining what we know. Expert Systems can easily sound "expert," but they do provide a classic example of GIGO (garbage in garbage out). When expert system designers start interviewing human experts, they quickly find out how automatically (translate that as "unconsciously") most experts operate. Only the very good ones know the exact boundaries of their domain of expertise unless they stop and work on it for a bit. Setting up the boundaries of our own personal knowledge base lets us ask more easily the next two questions in expert system design: (1) What do we NOT know?, and (2) What would we like to discover? We hope you spent some time carefully reviewing some of the areas of expertise and ignorance that delimit your life. Join us now as we wander through our own boundary conditions.

The Known World

Some general comments first on the way we look at the world. At the top of the list: we love exploring. Right next to that: we consider laziness a high art form. For us the joy of life comes from standing right at the border of our safely known world and peering into the chaos of the rest of the universe. Most of our efforts focus on designing tools of various types to help decipher what we see in that chaos. But somehow with such a host of fascinating things going on in the universe we usually end the day feeling like the child in the candy store: so little time and so many worlds to see.

Our own knowledge base from the micro-worlds of medicine, physics, psychiatry, and business includes a great deal of information about how the human nervous system makes decisions, learns from success and failure, modifies both data base and logical tools, and then ages successfully. The data base for the neurophysiological and neuropsychological parameters of importance to us grows rapidly and must come from a variety of sources around the world. We gave up trying to read all the physics and medicine journals ages ago. Even keeping up through a major national scientific data base requires an inordinate amount of personal time and on-line time. As our interests gradually expand into such areas as imaging systems and computer simulation we again fall prey to the ancient cry of professionals around the world, "the faster we go the behinder we get!"

Enter the expert system. As soon as II's and Macintoshes started taking over the whole house we obviously began wondering if the little characters could go to work on some of our projects during the wee hours of the night after we finally collapse. As we gradually learned a little more about LISP, natural languages, extensibility, and program self-modification the answer seems to come out "yes, we could create some helpers." So now for the next year we shall take you along as we design an assistant to help us in our own work.

To help us our fledgling expert needs:

(1) our known data base from neurophysiology and physics;
(2) worldwide sources of research information accessible by telecommunication or mail;
(3) the ability to access, select, and retrieve data from those sources;
(4) sufficient comprehension of the data not only to allow retrieval but organization, cross-correlation with prior knowledge, synthesis of the material, and abstract preparation for our review;
(5) the ability to learn from us as we accept and reject various pieces of information;
(6) the ability to explain its actions to us and to itself;
(7) and finally, a priority structure and logical capacity to question our deci-

sions, asking us to review our own logic and data base when a decision we make does not naturally follow from the micro-world known to the computer.

Now if we had to sit at the screen and handhold our little friend through all the processes outlined above we would just get further behind keeping up with the little beast's insatiable appetite for information. So what to do?

Strategy

Not long ago we ran across Alan Kay's delightful comments on having friendly little "agents" in our computer. These little critters would go off and do things for you like read several newspapers and provide you with a summary of information of particular interest to you, call you if your banker went broke, and even buy the computer an extra Meg of memory every now and then. Mr. Kay's comments gave us a clue about one of the fallacies in building expert systems.

A number of "expert" systems have grown out of a quick marriage between a cluster of computer experts and a cluster of target area experts. The main point of the marriage: to clone a silicon replica of the human expert and start it working right away. The route for training a carbon-based expert looks quite different. First pour in years of training as a generalist, add several years of didactic target area training, and then several more years of apprentice status to gain experience. Well, what if we used a similar approach here. Instead of starting out trying to make an immediate expert, what if we built an intelligent "girl-Friday" first? We could teach her first as a research assistant chasing down bibliographic background information, gradually increase her skills to the level of assistant-expert, and then build in the dialog-learning skills required to reach expert status. Well, for better or worse we have decided to proceed in that fashion. The deciding factor: by proceeding along human learning patterns we at least get to take a close look at what we know and cut down on the likelihood that we fill our new friend with garbage at the outset. Also, if we can build our system step by step in small modules, debugging the entire structure a year from now should go much more easily (the laziness principle).

Opening Topics

First off, let's leap right in and give our yet unborn apprentice a name so we can stop saying "it," "expert system," "apprentice", "friend," and "agent." How about "Angelina"? Don't worry if you don't like the name...just start writing and naming your own system.

Now we notice one thing immediately about our requirements for Angelina. She will need to understand at least English and at least the written (typed) word. Understanding natural language (as opposed to a formal language like LISP or Logo or BASIC) gets us into one of the most exciting areas of artificial (and natural) intelligence. A formal language has a precise structure and each word in the vocabulary has a single, unambiguous meaning. Natural languages convey much of their meaning by context, specialized vocabulary exceptions, tone of voice, and conversational history between the members of the dialog playing important roles. The central concepts we need for this first phase include vocabulary, context-free grammer, parsing, syntactic analysis, semantic analysis, and recursion. In a fascinating way, many of the concepts that help us make sense out of natural language form the underpinnings for object-oriented formal languages like Smalltalk. (Significantly, both ExperTelligence and Semantic Microsystems have commited themselves to adopting many features of Smalltalk into future releases

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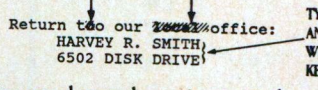

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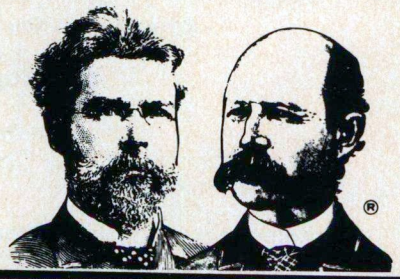

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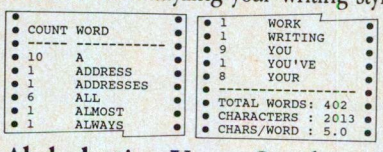

COUNT	WORD
10	A
1	ADDRESS
1	ADDRESSES
6	ALL
1	ALMOST
1	ALWAYS

1	WORK
1	WRITING
9	YOU
1	YOU'VE
8	YOUR

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of ExperLisp and MacScheme, respectively, for the Macintosh).

Vocabulary vs. Key Words

Key Word response occurs in almost every computer application from menus to telecommunication links. Angelina needs to possess a true vocabulary, not just operate at a reflex level when key words appear. We can actually write a quite simple program in BASIC that looks very intelligent using the key word concept (see *The Hitch-Hiker's Guide to Artificial Intelligence* by Richard Forsyth and Chris Naylor), but understands nothing. Check your local dictionary. In most human languages a 1000-word vocabulary will get you through most any daily situation. But if you check that vocabulary, you will quickly find 90 percent of the 1000 words probably have 3 to 7 meanings, depending on the situation under discussion (semantic meaning) and the word's usage in the structure of the sentence, e.g. noun, verb, preposition, adjective, adverb, or conjunction (syntactic meaning).

Syntactic and Semantic Analysis

Just like any grammar school student, our Angelina must learn how to quickly take a sentence apart structurally (syntactic analysis) and identify each word as a noun, verb, etc. You will often see this process called "parsing" and the computer will set up a "parse tree." For example, a parse tree might split a simple sentence into noun, verb, and prepositional phrases; then cut the noun phrase into noun and adjective; then go check the list of possible definitions for the word eliminating any meanings that did not require the word operate as a noun. Then Angelina must look at context to decide from recent memory of the current dialog, and distant memories of past interchanges on this subject with this person, which of several vocabulary definitions for noun usage to choose. To do that she can use a "thematic tree" similar in concept to the parse tree. Look at Figure 1 and decide how our Angelina would attack these three uses of the noun "intelligence": "An extraterrestrial intelligence did not think much of our intelligence or Angelina's intelligence."

As you can tell, Angelina will need to do a relatively small number of tricks over and over again on each word that enters her awareness and she will need to learn and store the results of those tricks. That gets us into recursion and programming languages. Even though we initially planned to use BASIC since so many of you have either Microsoft or Z-BASIC, language extensibility, self-modification, speed, and modularity requirements for Angelina present problems (contrary to popular opinion, you can do recursive programming in BASIC). Beginning next time, we shall start building Angelina's innards. We know of at least one good LISP for the Apple II in beta test that we hope to use as soon as the developers release it and we expect more as soon as the next Apple appears on the scene. Until then, we shall present Apple II examples in Logo and perhaps Z-BASIC. Please let us know if you hear of any good compiled LISP's.

Between now and next time, take a look at *The Hitch-Hiker's Guide to Artificial Intelligence* by Richard Forsyth and Chris Naylor for an excellent and understandable discussion of natural language comprehension. They present only Applesoft code and handle a difficult topic with such clarity that we consider it required reading (along with Heinlein). Till next time.

Michael C. Storrie-Lombardi, M.D. obtained a B.A. in Radiation Physics from Florida State University in 1964 and a Doctorate of Medicine from the University of Florida in 1968. He is a Diplomate of the American Board of Psychiatry and Neurology, and Associate Clinical Professor of Psychiatry and Behavioral Sciences at the University of Washington College of Medicine.

Lisa J. Storrie-Lombardi obtained a Bachelor of Arts in Business in 1982 and a Bachelor of Science in Physics in 1986 from the University of Washington. She will begin work on her doctorate in physics in September.

The Storrie-Lombardis have mutual interests in high resolution imaging systems, astronomy, friendly computers, and a small kitten named Taska. Together they serve as co-directors of Chrysalis Scientific, Inc., a private research organization.

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—Stuart Bell, Apple User Magazine 3/86

"The beautifully formatted (translated) text lets you view Pascal's structures, commands and syntax....P-tral is more than a functional utility. It's a learning tool."
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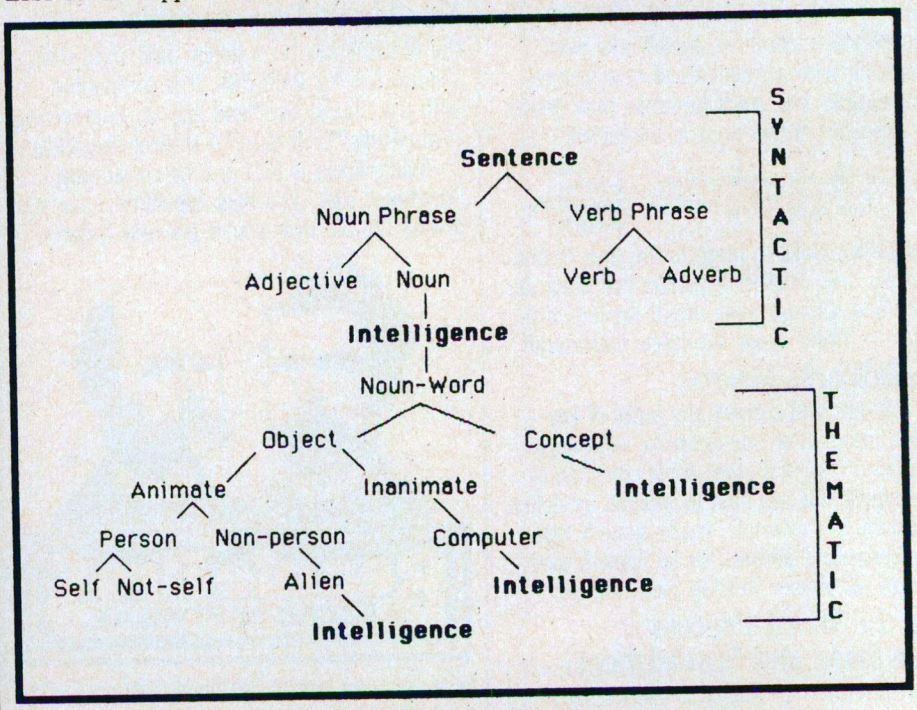
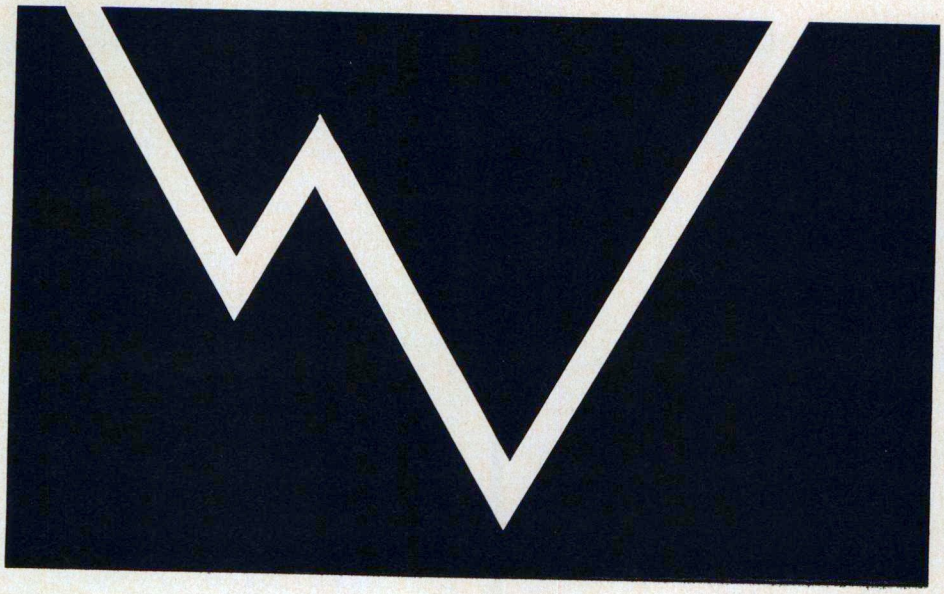


FIGURE 1: Semantic and Thematic tree diagram showing a multitude of possible meanings for "intelligence."

A.P.P.L.E. Doctor



Bruce F. Field

APPLEWRITER II AND MISSING KEYSTROKES

William Hanna has some followup on a problem I wrote about a few months ago.

"I would like to comment on your answer to the person who wrote about missing keystrokes with Applewriter II. I use this program extensively and I have not had the problem that he describes. I don't believe that the problem is software related for the following reasons.

"Applewriter II puts all text below the cursor position in low RAM, and everything after the cursor in high RAM. The no man's land in between is where text is added or deleted, so there is no great amount of memory movement while text is being entered. When the cursor is moved, either via escape commands or control "B" or "E," the text is then moved from low or high memory, leaving the cursor (and all of free memory) in the middle. But, of course, nothing is being entered at that time. Applewriter II uses a 64 character input buffer, which I think would be difficult to overrun. Applewriter II uses no monitor routines for normal text processing, although it is possible that the 80-column firmware could have some effect on things.

"I suspect, though that his problem is hardware related, such as dust on the keyboard contacts. I have had this trouble."

Thanks William, we appreciate the thoroughness of your answer. Of course, the easiest way for our reader to check your solution is to try his program on a different Apple.

EPSON ITALICS

Jack James also wrote with the solution to the problem with an Epson RX-80 printer printing only in italics with a *//c*.

"The problem is due to (1) the Apple outputting ASCII with MSB=1 (BFF note, the infamous eighth bit) and (2) the RX80 interpretting ASCII codes with MSB=1 as italics. I have been unable to find a direct reference to this latter point in the RX80 User's Manual, but Appendix A shows italic characters for ASCII codes above 127. Your questioner's setting his interface to 7 data bits and 2 stop bits works because the stop bits look like zeros and the first stop bit looks like the 8th data bit (i.e., MSB) to the RX80. Commercial programs will work satisfactorily if they output the ASCII codes with MSB=0 without going through the Apple's output routine that likes to set MSB=1.

"Epson Technical Support and a knowledgeable Apple dealer have confirmed for me that this is the way the RX80 and the *//c* work and that a reasonable solution is to configure the interface to send 7 data bits with 2 stop bits."

Thank you for straightening that out, Jack. But I wonder if you have any problems using graphics dump programs that want to send out 8 bits at a time. Seems to me you won't be able to print graphics pictures correctly unless you can find a program that prints 7 bits at a time.

AMPER DISK STORE & RECALL

Q. *I have been using the Amper Disk Store & Recall routine (*NIBBLE EXPRESS, *Vol. 2, 1982.) for a number of years now on my Apple II+. A couple of weeks ago, I tried to use it at work on an Apple IIe and it went out of it's mind. I traced the problem to this routine. I really didn't expect to have any problem since the II+ and IIe are supposed to be compatible, but I know how that goes. The article warns that if the RAM version of Applesoft is used the subroutine addresses must be changed, but it doesn't say to what. I would greatly appreciate your assistance on this.*

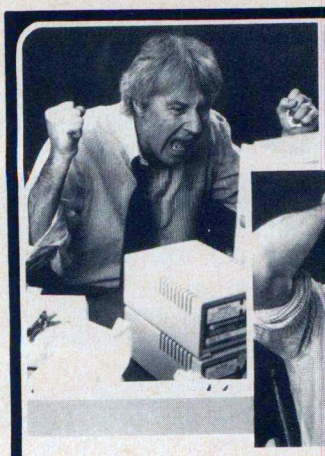
A. I tried the Amper Disk Store & Recall routine on my enhanced *//e* and had no problem with it. As you noted the *//e* is supposed to be compatible with the II+. There were some changes in the Monitor ROM routines (the built in programs that handle reading the keyboard, printing to the screen, etc.) but I checked and the Amper routine does not use anything that was changed either on the enhanced or unenhanced *//e*. The *//e* Reference Manual includes a separate booklet that contains the Monitor ROM listings, these can be compared to the listings in the Apple II Reference Manual. Generally, plain vanilla Applesoft programs that don't use any fancy tricks, will transfer okay from the II+ to the *//e*.

Are you using exactly the same program under the same conditions? Possibly when running on the *//e*, you are saving and recalling larger arrays and these interfere with the machine language program. Possibly you have a bad copy of the disk, or a fault elsewhere in the program appears to make the Amper routine fail. After running the program and it "goes out of it's mind," press reset and list out the Amper routine to make sure it's still correct and hasn't been modified.

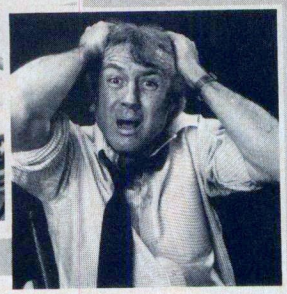
I'll explain RAM Applesoft for fun because very few current users have ever heard of it. When the Apple II first came out (not the II+) Applesoft was not built in. Instead, a BASIC that used only integer numbers and was very fast was included in ROM. This is called Integer BASIC and was written by Steve Wozniak, but is now rarely used. When Applesoft with its floating point numbers came along, it was distributed on cassette tape or disk and was loaded into RAM. Then you had to be careful where you put machine language routines so they didn't land on top of Applesoft. Every Apple since the II+ has had Applesoft safely tuck away in ROM.

DOS COMMANDS AND PRINTING

Q. *The Apple II Reference Manual says that*



Frustrated With Your IIe/c Word Processor/ Speller?



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Our sons have now switched (from AppleWorks to the BARD). The Spell Checker was instrumental in this decision. I am an article writer for magazines . . . and write every day. The BARD (Professional level) has made my work easier and fun again! One simply sits down and uses the BARD. A few checks here and there . . . the program rolls. I learned it in about a half hour and have been using it ever since. The speed of the editing and formatting keeps me moving . . . the "Quick" function macros let me keep a barrel of usable goodies a keystroke away. The simple use of different printer fonts unleashes the printer (this is the first program which included my Gemini 10x as a regular part of the program).

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CIRCLE **29** READER SERVICE CARD

I can turn on my printer by sending the slot number followed by a ctrl-P. Back in the good old days when I used cassette tape, this sequence worked perfectly on this same equipment. However, when I struck it rich and bought a disk drive it went away forever. I tried every combination of ctrl-P's and ctrl-D's that I could think of. Oddly enough, a PR#1 will work but I don't think I should be sending BASIC commands from the monitor and I don't like that rubbish on my paper. I have found that if I send the entire desired sequence in one line it will work, for example 1ctrl-P800L followed by a carriage return. However, even this is inadequate since the printer turns off at the end of the sequence and doesn't stay on as it should.

A. Well, well . . . where to start? Before you had a disk drive and DOS operating, it was perfectly acceptable to type 1ctrl-P from the Monitor to turn on the printer. It was also acceptable to include an Applesoft program line like 100 PR#1. Once you have DOS on board, things change a little bit. The way DOS 3.3 works is to look for DOS commands by intercepting all output from and input to the program. That is why from Applesoft, you must use 100 PRINT CHR$(4)"OPEN FILENAME" type commands. When they are output, DOS intercepts them, recognizes them as DOS commands, and executes them. If you type something from the keyboard, DOS intercepts it and checks to see if it is a DOS command, before sending it on to Applesoft or whatever. If you use PR#1 from an Applesoft program or 1ctrl-P from the Monitor, DOS gets disconnected from the output and can't see any DOS commands being output. It gets very upset about this, so the next time the program requests input from the keyboard the request goes normally through DOS and it changes the output pointers back to point inside DOS, effectively turning off the printer. That's why your 1ctrl-P only works for one line, the Monitor returns to request input from the keyboard after finishing that line and DOS reconnects itself.

Now lets straighten out the PR#1 problem. True, PR#1 is an Applesoft command, but it is also a DOS command. If, in an Applesoft program, you type 100 PR#1, that is an Applesoft command. But, if you type 100 PRINT CHR$(4)"PR#1," that is a DOS command. CHR$(4) is ctrl-D of course. (To confuse the issue further, PR#1 typed from the keyboard is also a DOS command because DOS sees it first before it gets sent to Applesoft or the Monitor.) So typing a PR#1 command from the Monitor is the correct method for turning on the printer. You can turn it off with PR#0 or, if you don't want that string printed, pressing RESET also turns it off.

This description only holds for DOS 3.2 and 3.3—ProDOS works differently.

WHO'S DRIVING?

Q. *I am writing about an Integer Basic program called Driver on my school's Apple II+. The problem is that sometimes when we CATALOG a disk with Driver on it, Driver does not show up, although all the other programs do (including other Integer Basic programs)! Trying to load Driver results in a (BEEP) FILE NOT FOUND error. To make matters worse, if Driver does not show up on one of the disks it is on, it doesn't show up on any of the others, and when it shows up on one of them, it shows up on all of them!!! Also, this happens on my Apple II+, not only the school's. This has happened day after day, and I finally decided to figure out what was happening. So far I have had no luck. I did, however, zap the disk and the entry for Driver said it had been deleted. It's like some mysterious vistor comes at night and deletes or undeletes Driver on all of the disks. Do you have any suggestions?*

A. This really is a mysterious problem. One possibility is that when the copies were made the disk drive speed was a little

fast or slow so, when reading the disk you sometimes get errors that make the program disappear from the CATALOG. Another possibility is that some other program you run prior to running Driver is inadvertently modifying DOS so that it fails to CATALOG properly. (Or, maybe your teacher is giving you a subtle hint not to play games at school.) I think you should get a good copy of the DOS 3.3 System Master diskette and, using COPYA, copy the System Master to a blank disk. Delete everything except the HELLO program, LOADER.OBJ0, and INTBASIC. Then copy the Driver program to the new disk using FID (not COPYA). FID is a program that copies individual files or programs from one disk to another and is on the System Master diskette. Before running Driver, turn off the Apple, wait a few seconds, then boot up on the new disk and run Driver.

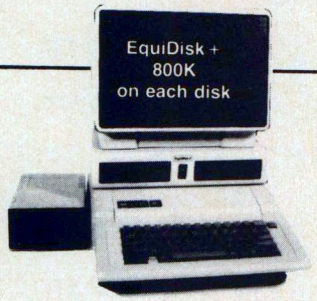
SEARCHING AND REPLACING CARRIAGE RETURNS

Q. *When downloading files from the Radio Shack 100, a large number of unwanted carriage returns are inserted in the text file. These subsequently have to be removed by hand and since they are not visible on the screen there are usually a few overlooked and are only caught after the first printout. Using the standard routine for global replacing, I tried control F followed by a slash, a control J, another slash, a space, another slash and an A. It did not work, neither did a CR instead of control J. If there is no way it can be done with the "find and replace," is it at least possible to make the "returns" visible on the screen?*

A. Applewriter II doesn't *seem* to be able to handle carriage returns in the global search and replace routine because the return is the signal for the end of the line. You should be able to use the routine to remove unwanted linefeeds if by using control-F, slash, control-J, slash, slash, A. Applewriter II does allow other characters to be substituted for the carriage return. In Applewriter II, you can remove the carriage returns by entering the following command control-F !#! !A, that is control-F, exclamation point, pound sign, exclamation point, space, exclamation point, and the letter A. That will replace all occurences of the carriage return with a space. Applewriter II also permits you to make the carriage returns visible on the screen as a right bracket. You access this from the special functions menu—use control-Q to get this menu, then select G, toggle carriage return display.

Although not very elegant, the following Applesoft program will also remove carriage returns. As set up, it reads the text file, "FILE1," and writes a new file without the carriage returns as "FILE2." You can change these names to whatever you want by changing line 110. It is restricted to a file size of less than about 36000 characters (the amount of free space in an Apple).

```
100 DIM B$(141)
110 INFILE$ = "FILE1" :
    OUTFILE$ = "FILE2"
120 PRINT CHR$(4)"OPEN "INFILE$
130 K = 0 : ONERR GOTO 250
140 PRINT CHR$(4)"READ "INFILE$
150 K = K + 1 : J = 1 : B$(K) = ""
160 GET A$
170 PRINT " ";A$;
180 IF A$ < > CHR$(13) THEN
    B$(K) = B$(K) + A$ : REM IF NOT CR
    ADD CHARACTER TO STRING
190 IF A$ = CHR$(13) THEN
    B$(K) = B$(K) = " " : REM REPLACE
    CR WITH A SPACE200
    J = J + 1 : IF J < 256 THEN 160 : REM
    GO GET NEXT CHARACTER
210 GOTO 150 : REM IF STRING = 255
    CHARACTERS, START A NEW
    STRING
240 REM — NOW START PRINTING
    TEXT TO NEW FILE —
250 POKE 216,0
260 PRINT CHR$(4)"CLOSE "INFILE$
270 PRINT CHR$(4)"OPEN "OUTFILE$
280 PRINT CHR$(4)"WRITE "OUTFILE$
290 FOR J = 1 TO K : PRINT B$(J); :
    NEXT J
300 PRINT
310 PRINT CHR$(4)"CLOSE "OUTFILE$
320 END
```

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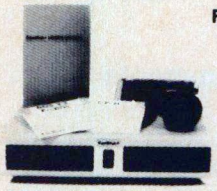

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CIRCLE 17 READER SERVICE CARD

Write A.P.P.L.E.

Readers' forum

A Loyal Non-oppositionist

I heartily disagree with the "loyal oppositionist" viewpoint printed in the June 1986 Write-A.P.P.L.E., and would like to voice my support for the status quo. Personally, I feel that the magazine has changed with the composition of the Apple user — three years ago, many owners were software writers and experimenters, while a far greater number of the current population of Apple owners are simply users of application software. Besides, with no need to re-invent the wheel, many of the monitor entry points, subroutines, etc., are clearly documented in the *All About* series and back issues of the magazine. While I personally enjoy technical articles and thoughtful programs, a shift towards user support and away from programmer support is certainly understandable. Of course, the programming help is always there, in the form of the Hotline and the Consultants list. Please accept my support for the current perspective and style of publication.

Marc Apfelstadt

Sound Tester Comments

I learned a number of new things entering Ed Sachs' "Sound Tester" part 1. The first is that there is apparently a difference between the way Big Mac.C handles the ASC pseudo-op and the way Big Mac.LC (my version) does.

I found that I had to enter:

```
64 ASC "SOUND TESTER"
66 HEX 8D 00
```

instead of the original code as it was entered in the listing.

I also learned that Big Mac.LC did not flag as a mistake an ADD op code mistakenly placed for an ADC. It was assigned the code $A8 to the command ADD TEMP1. $A7 is not a 6502 op code, but further perusal of the Big Mac.LC documentation showed that ADD is a Sweet 16 op code, of the form $An, with the following byte specifying the register, in this case $07; Big Mac thought this was a Sweet 16 command, and the format was proper, so it did not object.

The third thing I learned was that the program is wrong. The last instruction:

```
580 BPL LOOP2
```

should be:

```
580 BNE LOOP2
```

This will be like the BNE LOOP1 in the NOISE sub. When the value of L is set to over 127 ($F7), the high bit is set. Line 579, DEC L, conditions the N flag in the status register, which will be the same as the high bit in the accumulator. As a result, our plucky 6502 thinks that L contains a negative number, and the branch test fails. The program appears to work with values of L less than 128 ($80), but produces only a short blip of sound for values equal to or over 128 ($80). This error is in the original article also, reprinted in *Peeking at Call -A.P.P.L.E. Vol 3.*

May I echo Mr. Popenoe's question about when or whether Big Mac.LC will be upgraded to assemble the 65C02/65802/65816 instruction set?

I realize that probably 1000 people have written you about this, but I'm just so proud of myself I had to share it with you. Thanks. I look forward each month to my next issue of *Call -A.P.P.L.E.*

Bob McCown
3620 Zia Drive
Gallup, NM 87301

Currently, Big Mac.C supports the 65C02. While there is, at this time, little support for the 65816, if rumors about the new Apple II's are correct, there may be alot of support for it by next year.

Truth is Stranger than Fiction!

To understand the strangeness of the program below, we need only two pieces of information. They are: (1) a random number sequence in Applesoft is seeded by invoking RND with a negative argument, and (2) the seed is stored at locations 201 thru 205 ($C9 thru $CD).

```
10 REM ** FIRST SET OF
   OUTPUTS
20 S = ?
30 Z = RND(S)
40 FOR A = 201 TO 205
50 PRINT PEEK(A);"";
60 NEXT A
70 PRINT
80 REM ** SECOND SET OF
   OUTPUTS
90 Z = RND(?)
100 FOR A = 201 T0 205
110 PRINT PEEK(A);"";
120 NEXT A
130 PRINT
140 END
```

Thus, it appears that if the two occurrences of '?', lines 20 and 90, are replaced by a negative number in the above program, the seed will be printed out twice. That is usually, but not always, the case! For example, if '?' is replaced by '-1.77', we obtain

```
126 42 61 115 138
```

```
126 38 61 115 138,
```

and if '?' is replaced by '25.5021', we obtain

```
122 1 19 115 33
```

```
121 2 38 230 67.
```

Perhaps a piece of fiction could be written to explain the noted peculiarity, since, unfortunately, no rational explanation has been found. However, for the simulationist the problem is not serious, since by fixing the method of seeding for experiments, results can be duplicated.

William Jackson
34509 Spring Valley Drive
Westland, MI 48185

ProDOS and Disk Controllers

As a follow up to the letter from Keith Davison in your May 1986 issue, I supply the following experience with controller cards and ProDOS 1.1.1:

1. I have tried three different cards with both //e and II+ systems using DOS

3.3, ProDOS 1.0.1, and ProDOS 1.1.1 operating systems.
2. All cards and systems work satisfactorily in the //e.
3. The controller card supplied by Memory Plus Distributors, 2632 W. Baseline Road, Mesa, AZ 85202 will not work in the II+ with ProDOS 1.1.1—in fact, if the disk is not write-protected either track $0 or track $11 (or both) are destroyed by being written over.
4. The controller card supplied by Jameco Electronics, 1355 Shoreway Road, Belmont, CA 94002 worked satisfactorily in all cases, as did the third card which was the original Apple card that came with my II+.

I conclude from the above that there are some subtle changes in ProDOS 1.1.1, and that there is variability in the timing characteristics among the various cards, as suggested by Keith Davison in the letter referenced above.

W.A. Craven, Jr.

Through Rain, Snow, Sleet, and Silicon Chips

Thanks to Harold Schuckhart for writing and to you for publishing the Adjustable Calendar Program which appeared in the July 1985 issue. I also caught the patch in the June 1986 issue. It's useful to the Post Office letter carriers as a vacation planning calendar.

Anonymous

Focus On Languages

I've got three requests (questions) which I hope you can answer.

1) Recently I've been seeing ads for a product called Kyan Pascal, but haven't yet seen any reviews in your magazine . Obviously, it's less expensive than Apple Pascal 1.3, but how does it compare in speed, programming ease, and features?

2) Could you publish a brief comparison of the 2 or 3 different C compilers available for the Apple II?

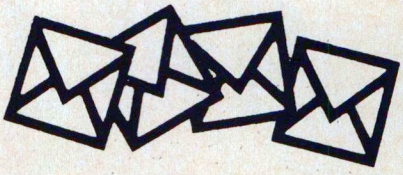
3) Are you aware of a good implementation of Common LISP for the Apple II? If so I'd like to know about it.

Thank you for your help.

Ken Hamel

[You'll be pleased to know that a review of Kyan Pascal was published in our July 1986 issue. Also, we hope to look at an Apple II LISP and compare C compilers at some future time.]

LETTERS POLICY



Call-A.P.P.L.E. welcomes letters from its readers on any topic relating to the magazine's content, A.P.P.L.E. services, experiences with hardware and software, current issues in computing, or programming notes. Because of space limitations not all letters can be selected for publication or printed in their entirety, but we try to present a representative sample of your views. If you would like your address published, please include it near your signature.

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THE MARKETPLACE

The following items are selected by our editorial staff from the large number of product announcements and news releases sent to us daily. They are presented solely to keep you informed about the current market for Apple related hardware and software. As we have not tested many of these products, appearance here does not necessarily represent endorsement or recommendation by A.P.P.L.E. Further information about items appearing in The Marketplace can be obtained through the Reader Service Card. If you contact any manufacturers directly, please mention that you learned about them in *Call-A.P.P.L.E.*

CREATE YOUR OWN CLIP ART

CLIPCAPTURE is a menu-driven graphic utility that enables owners of The Newsroom to create their own clip art disks, Print Shop users to produce new graphics, and owners of both to freely interchange graphics and art. Apple artists can also convert their hi-res artwork to either Print Shop graphics, or to Newsroom clip art. CLIPCAPTURE clip art disks are unprotected and functionally identical to the original clip art disks supplied with the Newsroom. Each clip art disk is assembled using up to 70 clip art pages, with each page containing art gathered from a variety of graphic sources. The "pieces" that make up each clip art page can be fashioned from Print Shop compatible graphics, clip art, hi-res text, Newsroom photos, digitized hi-res pictures, or from any hand-crafted hi-res graphic screen. Over 250 pieces of clip art can be placed on each CLIPCAPTURE disk.

In addition to clip art disk production, CLIPCAPTURE can also create Print Shop compatible graphics from Newsroom photos, clip art, or any hi-res picture. CLIPCAPTURE works with any Apple II series computer and sells for only $24.95 plus $2 S/H (WI add 5%) by direct order only. MC/VISA orders may call 1-800-628-2828 ext. 863 (orders only) for faster service. *CLIPCAPTURE, 477 Windridge Drive, Racine, WI 53402.*

CIRCLE **30** READER SERVICE CARD

DESIGNING COMPUTER-BASED INSTRUCTION FOR MUSIC AND THE ARTS

Designing Computer-Based Instruction For Music And The Arts and its accompanying disks provide suitable study material for any individual, student, or professional in the arts or humanities who has a serious interest in understanding and creating computer-based instruction (CBI) using the Apple II series microcomputers.

The authors use a unique, top-down instructional approach working from universal models or 'program shells' in Applesoft BASIC. Design applications include the use of graphics, animation, polyphonic music, and various input devices (mouse, KOALA pad, joystick, etc.) and provide for synchronization with slide projectors and tape recorders.

A major feature of this instructional package is the unique set of software tools and machine language software (provided) which allows the reader to implement character-based graphics and digital sound considerably beyond the built-in capabilities of the Apple II series microcomputer. One disk includes demonstration programs and graphics and music tools accessible from BASIC. The second disk contains music timbre and character edtitors to create sounds and graphics.

The text provides guidelines for producing effective CBI designs for elementary programs on one hand and high-quality, professional software on the other. Among the techniques explored in this important text are error trapping, disk-based data structures, student record keeping, graphics, title screens, menus, and bulletproofed input. There are twenty-one carefully sequenced Work Projects which encourage readers to actually use the concepts and skills presented, making their learning a valuable part of their applied skills. *Temporal Acuity Press, Building 1, Suite 200, 300-120th Avenue NE, Bellevue, WA 98005, (206) 462-1007.*

CIRCLE **31** READER SERVICE CARD

TWIST-A-PLOT CONTEST

Creative computer kids can win up to $280 worth of software in a "Twist-A-Plot" contest announced today by Scholastic Software. The contest, sponsored by Scholastic through Apple Computer Clubs International, invites youngsters in grades 2-8 to create an original project based on the Twist-A-Plot adventure programs found in each edition of Scholastic Software's popular MICROZINE software series.

Twist-A-Plots are interactive fiction-writing exercises that let youngsters choose a variety of plot options to create their own adventure stories. Each MICROZINE program has a Twist-A-Plot as one of four original programs on the series' program disks. MICROZINE is a computer learning library issued as a subscription series to reinforce children's critical thinking, problem-solving and computer literacy skills.

To enter the contest, children can select from a variety of projects to apply their fiction-writing, artistic or computer-savvy talents to any Twist-A-Plot/MICROZINE program. They can illustrate the Twist-A-Plot (or a scene from it) in a poster, picture, picture book, cartoon or computer graphic program. They can create an original board game based on the adventure or, if they like, they can create a new ending to the adventure. Entries will be judged on creativity, attractiveness, and how well the project represents its Twist-A-Plot adventure.

Winners will be selected in two categories: grades 2-4, and grades 5-8. At each level, judges will announce two first prize winners, five second prize winners and five honorable mentions. Each first prize winner will receive a one year subscription to MICROZINE (seven issues, $280.00 retail value). Each second prize winner will receive one issue of MICROZINE ($39.95 value), and each honorable mention will receive Apple Computer Club merchandise ($15.00 retail value).

Children may enter the MICROZINE Twist-A-Plot contest as many times as they like. All entries must be postmarked no later than November 15, 1986. To be eligible, kids must be members of Apple Computer Clubs International. For a MICROZINE contest entry kit and club membership information, contact: *Apple Computer Clubs International, MICROZINE Contest, 175 Middlesex Turnpike, Redford, MA 01730, (800) 343-1425.*

CIRCLE **32** READER SERVICE CARD

CONVERSATIONS WITH YOUR APPLE

Chatterbox enables the Apple II computer to interact verbally with students, using speech recognition and synthesis. *Voice Reading Ability Drill*: Uses the natural voice of the Echo Speech Synthesizer to teach words, with print and illustration; then actually listens to students reading loud, monitoring their accuracy! *Voice English*: The first and only computer voice-active language learning system; teaches words, phrases, and sentences in sequential lessons; student voice responses corrected as needed! *Chatterbox Dictionary*: Presents vocabularies in groups, includes Community Signs, Body Parts, hundreds of essential words, illustrated. *Voice Math*: Numbers, money, time, dates, shapes taught in a verbal I/O format.

Each package includes Software and Sony Headset/Mike. . . . . .each $295. (requires Apple II+ or *IIe* with 64K of memory, Echo Speech Synthesizer, and IntroVoice Input Module). *Chatterbox, 29 Elk Ridge Lane, Dept. C, Boulder, CO 80302, (800) 531-5314, AK/HI (800) 821-0728, TX (800) 292-5619.*

CIRCLE **33** READER SERVICE CARD

MOUSEFILER

MouseFiler is a file and directory manager for the Apple *IIe* and *IIc* that provides a fast and flexible way to organize your disks using the power of the Macintosh interface. The desktop, windows, pull-down menus, and the mouse are used to provide a robust set of functions for managing disks, directories, programs, and files. Windows are used to display the contents of directories, all disk volumes currently available and on-line, the path to the current directory, and the clipboard. All interactions with the user are done through dialog windows which ask for specific information when required to complete an operation. The same intuitive interface as the Macintosh is built into MouseFiler so that the pull-down menus allow only the functions that make sense to be selected depending on the current contents of the desktop.

File operations include the ability to create and display directories, copy and paste files, rename, delete, sort, compare, and view files. The contents of directories are displayed in a window called the "Directory" window which is refreshed whenever the user changes the current directory. The ProDOS path to the current directory is displayed in a special window called the "Path" window which is updated dynamically as the current directory changes. Files are then selected from the directory window using the mouse. MouseFiler provides several flexible ways to perform selections. These include single file selection, multiple file selection by holding down the open-apple key, select by type which selects only those files of a given type (i.e. AppleWorks word processing files or BASIC programs), and select all files. Information about any file can be obtained by using the "Get Info" command.

Disk volumes may be formatted, copied, compared, renamed, and diagnosed for bad blocks. Volume space allocation is available at any time. MouseFiler supports all types of ProDOS disks. These include floppies (such as Disk II's, Unidisk, and the new Unidisk 3.5), hard disks (such as ProFile), RAM disks (such as the Apple RAM card or RamWorks). An applications switcher is provided. This allows the user to select a system program from the directory window and run it. MouseFiler may be installed as an application under Catalyst. This provides all of MouseFiler's power, using the same mouse-driven interface, whenever it is needed. MouseFiler runs on the Apple *IIe* (128K enhanced) or on the Apple *IIc* using the mouse or the keyboard by itself. Price: $39.95. *Harbor Software, PO Box 872, Acton, MA 01720, (617) 263-1870.*

CIRCLE **34** READER SERVICE CARD

HACKERMAN STAN AND HIS AMPERSAND BAND

CopperSoft Solutions announces their first software package for the Apple *IIe* and *IIc* computers. This new programming utility is called Hackerman Stan and His Ampersand Band, and it sells for $49.99.

This is a two-part software development tool designed to be easy enough for beginners to use, yet advanced enough to meet the needs of experienced programmers. The first part of the package, Hackerman Stan, is a program that writes programs. It generates feature-packed data management software from screen layouts designed by the user (up to five screens of input, forty input fields per screen).

To let Stan create a program, all one has to do is use the built-in screen editor to design a data-input screen layout, and maybe some help screens if desired. The program takes over from there and generates a complete database system in Applesoft BASIC using the machine language commands that make up the Ampersand Band. The complete programs are fully commented and can easily be modified by the user. The second part of the package, the Ampersand Band, is a set of new BASIC commands which add speed and advanced features to Applesoft programs. Some of the features include super-fast WINDOWS, special programmable INPUT statements, clock card support, improved disk file access, and special string handling. It is these commands which are responsible for the high quality of programming that Stan puts out.

This system also allows you to write your own Desk Accessories in BASIC and add them to the existing ones. The DA's that come with the program include a very powerful scientific calculator, a screen dump to printer utility, and a special options menu. Help screens are also available from the DA pop-up menu. The software requires at least 128K or RAM and the ProDOS operating system. It supports extended memory cards, clock cards, hard disks, Unidisk 3.5, Pinpoint and more. For product support, a free one-year subscription to the CopperSoft electronic Bulletin Board System is included with the purchase. Owners of Hackerman Stan can get free assistance and software on-line from CopperSoft Solutions. There are no on-line charges, just the phone call. For more information contact *CopperSoft Solutions, 1512 Atlantic, PO Box 404, Hancock, MI 49930. (906) 482-8160.*

CIRCLE **35** READER SERVICE CARD

MODEM MGR™

MODEM MGR is a new modem communications program for the Apple][+, //e, enhanced //e, and //c. It supports most serial cards and internal or external "smart" or dumb modems at baud rates from 110 to 19200 baud.

MODEM MGR provides a large buffer to capture received text for reviewing, editing, saving to a disk file, or re-transmitting.

FEATURES: Modem control (dial, answer, hangup, where applicable), full-screen editor, programmed operation with macro script files, programmable function keys, XMODEM file transfers, error-free transfer of DOS 3.3 or ProDOS files, efficient transfer of sparse random-access files, unattended option with password protection, terminal emulation (DEC VT-52, DG D200, etc.), help screens, screen capture (snapshot), full- or split-screen display with block send (for CB, chat, or packet radio), continuous on-screen display of time-of-day or elapsed time (with some clock cards), auto XON/XOFF, auto disk save, carrier control or "smart" modem control, programmed dialing (from phone directory, function key, or macro script file), printing (from disk file, capture buffer, or online), and many other features.

MODEM MGR is fast. With a Videx 80-column card, it will receive and display ordinary text at baud rates up to 19200 baud continuously (non-stop) without losing any characters.

MODEM MGR supports Apple 40-column, Apple 80-column, Videx Videoterm or Ultraterm (all eight video modes), most printer, serial, multi-function, and modem cards, most external "smart", auto, or dumb modems, and some clock cards. The programs are supplied on both sides of three 5-1/4" disks (six sides) and are not copy protected. Instruction manual (284 pages) and both DOS 3.3 and ProDOS versions for only

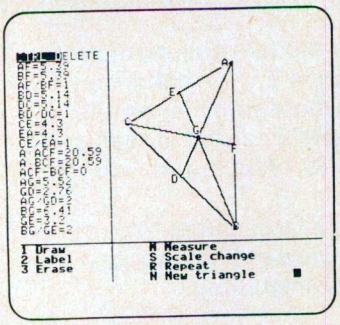
$50

plus sales tax (Calif. residents) plus $3 shipping. Not available in any store. Send check to:

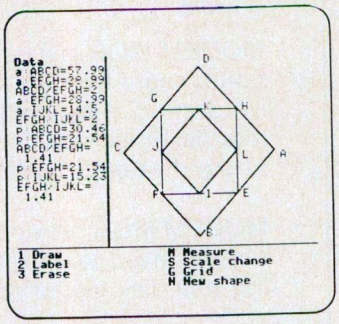
MGR Software
Suite 101
305 South State College Blvd.
Anaheim, CA 92806
(714) 993-0294

CIRCLE **20** READER SERVICE CARD

GEOMETRIC SUPPOSERS



The Geometric Supposer: Triangles



The Geometric preSupposer

Three Sunburst programs which encourage students to become active participants in the process of learning geometry are for use with the 64K Apple II+, IIe, IIc. *The Geometric Supposer: Triangles, The Geometric Supposer: Quadrilaterals,* and *The Geometric preSupposer: Points and Lines* are co-authored by Judah L. Schwartz and Michal Yerushalmy through the Education Development Center in Newton, Mass.

Triangles and *Quadrilaterals*, designed for students in grades 8 and up, let users make any construction they wish on any triangle or quadrilateral. They are encouraged to play with figures, come up with conjectures, then go back to traditional methods of geometry to prove their theorems. The program allows students to repeat with ease previously performed constructions on a different case of the original shape. *The Geometric preSupposer*, for grades 5 and up, helps students master such basic concepts as congruence, similarity and parallelism. Students measure lengths, angles, areas and circumference of simple constructions and can experiment with different relationships among these measurements.

The authors are also developing Geometric Supposer Student Workbooks which will be available in the fall, along with the fourth program in the series, *The Geometric Supposer: Circles*. *The Geometric Supposers* and *The Geometric preSupposer* are priced at $99 each and include one diskette plus backup, a "quick reference" card, and a teacher's guide describing numerous applications of the program. A free teacher training videotape available from Sunburst explains the programs' capabilities and suggests ways of enriching geometry learning. *Sunburst, 39 Washington Ave, Pleasantville, NY 10570, (800) 431-1934.* NY, AK and Canada call *(914) 769-5030.*

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SUPERBASE/SUPERSCRIPT FOR THE APPLE II/IIE

Progressive Peripherals & Software is pleased to announce that Superbase and Superscript are now available for the Apple *IIe*/*IIc* computers. Superbase is a powerful yet easy-to-use database management system that lets you simplify and control your information, financial and inventory system demands. Superbase is perfect for business applications as well as home financial use. It helps you organize all your records—from complicated inventory control to your checkbook!

Superbase is fully menu-driven. It makes sorting, creating and entering records simple for even the beginning user. You can create complex custom applications with Superbase's BASIC Enhancement. This feature puts over 100 powerful commands at your fingertips. This option saves you more time the more complicated your data-management requirements are. Superscript is a simple to use, truly intelligent word processing package that gives you much more than just a word processor. Superscript has a built-in spelling checker that edits your files for errors and show you the correct spelling. The built-in mailmerge facility lets you create high-quality reports, tables, lists, mini-spreadsheets and labels. A full function calculator is built into the program and can be used interactively with your document. You have over a dozen commands at your fingertips with a "Lotus-style" menu and easy-to-access on-screen display. Both Superbase and Superscript support the Apple Scribe and most popular printers on the market today. The programs come with an easy-to-understand manual. Price: Superbase for Apple II/*IIe* $99.95, Superscript for Apple II/*IIe* $79.95, Superbase for Apple ProDOS (Hard Disk) $99.95, Superscript for Apple ProDOS 3.3 $79.95. *Progressive Peripherals & Software, Inc., 464 Kalamath Street, Denver, CO 80204, (303) 825-4144.*

CIRCLE **37** READER SERVICE CARD

COMPUTER MUSICIANS COOPERATIVE

The Association of Independent Microdealers (AIM) announces the formation of a special interest group called "Computer Musicians Cooperative" (CMC). It is the purpose of AIM/CMC to bring together computer dealers, music dealers, manufacturers, and end users interested in computer music. AIM believes that end users wishing to experience computer music applications are lost because music dealers are unfamiliar with computers, computer dealers are unfamiliar with keyboards and synthesizers, and generally, both are unfamiliar with computer music software and interfacing. AIM/CMC hopes to close the gap between computer and music dealers and, at the same time, offer the end users a communication channel to each.

AIM is now accepting membership applications from music dealers as well as computer dealers interested in computer music. In addition to providing dealer training and consulting, AIM will distribute to its members a wide range of computer music products. For end users AIM/CMC offers: a Buyers Guide to computer music products, special coupon offers, a toll free hot line, electronics bulletin board, and among other things a subscription to "MINUTES", the AIM/CMC monthly magazine. The annual membership rate for the individual end user is $25.00 per year. *Association of Independent Microdealers, 3010 N. Sterling Ave., Peoria, IL 61604, (309) 685-4843.*

CIRCLE **38** READER SERVICE CARD

PRINTER PROGAMMING HANDBOOK

Cardinal Point Incorporated announces the release of the second volume of *PROGRAMMERS' HANDBOOK OF COMPUTER PRINTER COMMANDS II, for models as new as 1985*, a compilation of the printer control codes of daisywheel, dot matrix and color desktop printers manufactured during and before 1985. The second handbook complements (but does not replace) the information found in the first volume and lists the control codes of more printer models. There are several new manufacturers as well as repeat manufacturers represented in the new volume. The codes are listed in table format alphabetically by manufacturer and subdivided by model, making the location of data for a particular printer easy and fast. The tables list a text version of the codes as well as the decimal and hexidecimal equivalent (or octal where needed) and a brief but detailed description of the code's function. The book also contains a name and address listing for all manufacturers listed in both volumes, and an index of manufacturers and models for both volume I and volume II.

The editors emphasize the books are not operator's manuals or instructional books for printers. They are reference books for programmers where codes for hundreds of different printers can be found conveniently. The first handbook (for models through 1984) retails for $37.95. The second handbook (for models as new as 1985) retails for $26.95. The two book set (Vol I and Vol II) retail for $58.95. A $2.50 shipping and handling charge is also added to each order. Dealers prices are available upon request. Quantity Orders call collect. For more detailed information call or write: *Cardinal Point Incorporated, P.O. Box 596, Ellettsville, IN 47429, (812) 876-7811.*

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GAME BASED ON MAH JONGG

Activision, Inc. announces the release of Shanghai, a captivating new computer puzzle game derived from the ancient oriental game of Mah Jongg. Shanghai, for MS-DOS, Apple II, and Macintosh computers, is easy to learn but a challenge to master. The 144 tiles in Shanghai consist of seven visually different suits, which are stacked in a five-level dragon-shaped pyramid. Tiles must be removed in pairs, until all are removed or no additional moves can be made. Each time a new game begins the tiles are shuffled randomly, continually creating new challenges.

In Shanghai, strategy, and memory, and even luck are required to play the game successfully, since only tiles that sit at the left and right edges of the pyramid can be removed. As each set of tiles is matched, they disappear, leaving any tiles hidden underneath in view. Players can choose from different game options including solitaire, head-to-head matches against the clock, or multi-player tournaments.

Activision, Inc. makes a free Shanghai trial disk available to retailers and consumers. The disk contains one level of the Shanghai pyramid for experimenting with the program. Price: Macintosh version $44.95, Apple II versions $39.95. Individual consumers may obtain the free trial disk by writing to *Activision, PO Box 7286, Mountain View, CA 94039* and enclosing $3.00 for Shipping and handling. *(415) 960-0410.*

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HARD DISK SHARING SYSTEM

CMC Computer Systems of Santa Ana, California announces their Hard Disk Sharing System which will be marketed under the name "ShareWorks." The system allows several Apple II+, *IIe* and compatible computers, in a daisy chain, to safely access a CMC Hard Disk under ProDOS or DOS 3.3 operating systems.

"ShareWorks" simply locks out all other computers during disk access time and then quickly and safely arbitrates rights for the next computer requesting use. System limited to a maximum of 30 feet of cable thus works best in home, small office or school computer lab type environments. Number of workable stations governed first by cable length with further consideration as to amount and type of disk activity expected. "ShareWorks" consists of any CMC ProDOS + DOS 3.3 Hard Disk System plus a smart host card for each computer along with 25 conductor daisy-chained cables. Compatible with any software that can be loaded onto a CMC Hard Disk. Designed for easy installation and fool proof operation which makes system ideal for educational use. Systems are shipped complete with power supply, fan, cables and host cards that are ready to Plug-N-Go and feature fast autoboot. A Program Menu Selector is factory installed on each hard disk. Mean time between failure is more than 30,000 hours and systems are designed to be shock resistant with self parking heads eliminating crashes. No need of a dedicated computer with this system. Uses include Bulletin Board Systems, Accounting Packages, Data Bases, Word Processing and Spread Sheets for Home, School and Business.

Retail price set at $349.00 for the first two stations with each additional station costing only $195.00. In addition to this, a CMC Hard Disk System, starting as low as $795.00 for 20mb, is needed. *CMC Computer Systems, 1514 East Edinger, Suite H, Santa Ana, CA 92705, (714) 835-2462.*

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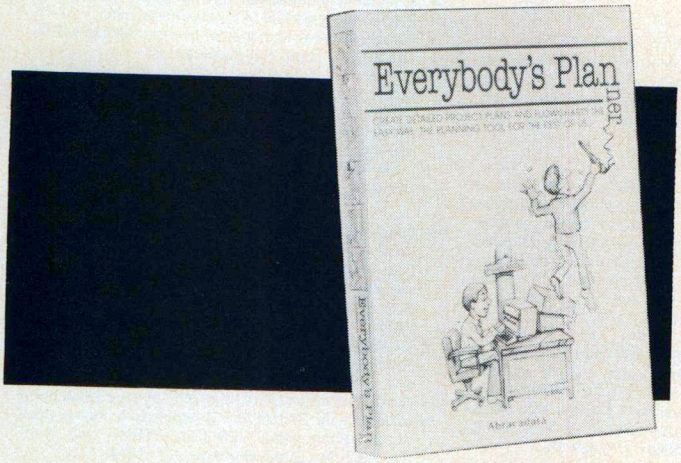
EVERYBODY'S PLANNER



Everyone has a project. But not everyone has a plan. How many times has the businessperson pored over paperwork, made lists, drawn plans and evaluated and re-evaluated schedules and deadlines, only to have critical dates pass them by? What about the building project that fell behind schedule because no one ever ordered those two-by-fours? How often do students wish they had mapped out the semester's coursework? And what about the precise timing required in a political campaign? Even the harried homemaker wishes she had anticipated the work involved in a dinner party.

NOW, with ABRACADATA'S new project management tool, anybody can have a plan. No more hit-or-miss projects based on hope for a little good luck. EVERYBODY'S PLANNER is an inexpensive, easy-to-use software package that helps administrators, employees, students, engineers, homemakers, girl scouts or entrepreneurs look to the future with confidence. And they can start making plans with EVERYBODY'S PLANNER in less than an hour, without having to learn a lot of computer or project managemant jargon.

EVERYBODY'S PLANNER is a two-part package that covers all aspects of planning. "SCHEDULES" features special charts which point out which goals must be met in order to complete the project on time. They tell you how much "slack time" is involved in completing your tasks. They outline participants' duties and deadlines, and estimate project costs. They give you early and late start and finish dates. "FLOWCHARTS" is a unique option which depicts the flow path of any process or ongoing operation, identifying important decision-making points. Price: $99.95. *ABRACADATA, PO Box 2352, Eugene, OR 97402, (503) 342-3030.*

CIRCLE **42** READER SERVICE CARD

APPLE AND KINKO'S RELEASES COURSEWARE CATALOG

Cupertino, CA — Apple Computer Inc. and Kinko's Copies of Santa Barbara, CA, have announced the availability of the first Kinko's Academic Courseware Exchange Catalog. This resource guide offers the higher education community information and a convenient way to purchase university-developed educational software for the Macintosh and Apple II computers at reasonable prices.

The first edition of the bi-annual catalog currently lists 30 academic software programs, with more than 100 programs expected to be listed in the fall edition. It is available at any of Kinko's 300 stores that serve more than 500 colleges and universities in the United States. The Academic Courseware Exchange will enable teachers to assign software to their classes as easily as they assign textbooks. Students can purchase software programs at the Kinko's store for between $7 and $30.

The first catalog includes such programs as "Animated Waves and Particles," a program from the Physics Department at the University of Tennessee that simulates wave and pulse behavior and other aspects of Physics; and "The Would-be Gentleman" from Stanford University, a program that simulates economics and social life in 17th century France.

Institutions and individuals interested in either purchasing courseware or distributing their courseware through the Academic Courseware Exchange should contact their local Kinko's or Kinko's courseware director at *800-235-6919* or, in California, at *800-292-6640.*

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BUSINESSWORKS PAYROLL

Manzanita Software Systems releases the *BusinessWorks Payroll System* completing the BusinessWorks accounting series. BusinessWorks Payroll is a comprehensive system designed for medium- to small-sized businesses with fewer than 1,000 employees. In addition to producing payroll checks and necessary government reports, BusinessWorks Payroll provides numerous payroll analysis reports, maintains employee information such as hire and review dates, wage and tax information, and converts payroll information to AppleWorks data base and spreadsheet files. Among its many features are the ability to prepare payroll for hourly, salaried, commission or piece rate employees on a weekly, biweekly, monthly or semimonthly basis. BusinessWorks Payroll handles up to 25 user-defined deductions (ten per employee), 25 commissions, 200 job codes and 100 standard rates.

BusinessWorks Payroll can be integrated with the other BusinessWorks modules to form a complete accounting system, or it can be used as a stand-alone system. Other modules include General Ledger, Accounts Payable, Accounts Receivable, Inventory Control and the System Manager (the only required module). BusinessWorks Payroll runs on the Apple *IIe* or *IIc* equipped with two UniDisk 3.5 drives or a ProDOS compatible hard disk. Price: $445. *Manzanita Software Systems, One SierraGate Plaza, Suite 200-A, Roseville, CA 95678, (916) 781-3880.* CIRCLE **44** READER SERVICE CARD

ASSEMBLY LANGUAGE AND HI-RES

Hi-Res Graphics and Animation Using Assembly Language by Leonard I. Malkin, Ph.D. ($18.95, paperback) is the book for both beginners in assembly language programming and assembly language literates who wish to extend their expertise to Apple II hi-res graphics and animation.

Whereas most books on assembly language do not feature hi-res graphics, this book uses hi-res graphics and animation as a tool to demonstrate the fundamentals of assembly language programming. This book also shows readers the secrets of producing professional hi-res animated graphics for games and a variety of other applications.

The first part of the book, following a discussion of binary and hexadecimal numbering systems and the use of an assembler, readers will be guided through each steps leading to the construction of a single arcade-type game written entirely in assembly language. Various aspects of hi-res animated graphics are covered with explanations. Illustrated with programs, topics include: vertical and horizontal movement, internal animation, paddle and joystick controls, collisions and explosions, scoring, sound generation, and the animation of multiple shapes.

The second part of the book explores color graphics and double hi-res techniques and requirements, including double hi-res color. Other topics include curved and diagonal movement, drawing over backgrounds, more sophisticated paddle and joystick controls, integrating BASIC with assembly language, and the use of BASIC and assembly language graphics for educational programs. Price: $18.95. *HAYDEN BOOK COMPANY, 10 Mulholland Drive, Hasbrouck Heights, NJ 07604, (201) 393-6306.* CIRCLE **45** READER SERVICE CARD

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We are thinking of including a "Coming Events" section in the magazine for conferences, trade shows, meetings, etc., that would have a broad regional, national, or international interest among Apple users. Please send details at least 2 or 3 months in advance to our Editorial Office.

We are also looking for well-written, timely reviews and tutorials on current software, hardware, and programming languages. Products sold through A.P.P.L.E. Co-op, or advertised in Apple-specific magazines, would be of particular interest to our readers.

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Publications
290 S.W. 43rd St.
Renton, WA 98055

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MOUSETRACER—Use your Mac,/Ie, or /Ic mouse and draw like the pros! Put cartoons, pictures, maps, etc. on the drawing board. Strap your mouse to the Mousetracer and with your favorite graphics program trace the picture of your choice. Works like a 1:1 drafting board pantograph. Send $34.95 + $3 UPS shipping (CA res add $2.10 sales tax) to: Brimark Innovations, 9821 Yolanda Ave. Northridge, CA 91324.

INTERNATIONAL COMPATIBLES—Supporting II+, Franklin, & all compatible users, with a monthly newsletter, public domain library, on-line services and personal attention. Membership $20 a year. Info SASE. Franklin Users Group International, 65 East Wind, Tecumseh, MO 65760, Modem (417) 869-5294.

THE LOST ARK OF THE COVENANT—An all-new machine language hi-res adventure game for the Apple II+ /Ie, /Ic with one drive (3.3 DOS). This adventure has won a gold medal in a Long Island Computer Show, and includes graphics routines from Penguin Software's Graphics Magician. With over 150 hi-res images, you can explore tombs, jungles, subterranean complexes, deserts and other enchanted terrains. This two-diskette adventure has taken over three years to create and can be yours for $14.95, with no postage charge! Send check or M/O to MICROSCAN, 1384 Lyon Place/Dept C, Wantagh, NY 11793. Include $2 if you want hint sheets and a map of this 100 location adventure. Orders will be shipped IMMEDIATELY. Call (516) 826-5807 for more information.

JOGGER—is the perfect RUNNER'S LOG for the entire family. You supply your daily mileage and time, the program produces 23 Hi-Res Graphs plus much more! Available on disk for Apple II series and Commodore 64 for $29. For more information, or to order, write to: PARSONS SOFTWARE, 1920 Briar Meadow, Arlington, TX 76014.

INTERFACE CARDS FOR WHOLESALE PRICES—16K RAM card $37.80, Z-80 card $35.90, 128K RAM card $64.00, 8088 card $57.30, 80 column card $45.80, Driver card $36.50, Coloer graphic card $61.50, Monochrome graphic card $69.00, Mouse $89.65, Telex card $157.15, and 60 more different kinds of cards for special prices. Hunter Electronic Co., LTD. P.O. Box 53-130, Taipei Taiwan, Rep. of China.

APPLEWRITER //e USERS—"AppleWriter Enhancer" is a collection of Powerful WPL programs that tremendously simplify AppleWriter usage. Developed for needs of small office. DOS commands from SCROLLABLE CATALOG; load files from SCROLLABLE CATALOG; on-line CALCULATOR for simple calculations; determine FREE DISK SPACE; AUTOPRINTING ROUTINE to avoid constant changing of print destination; ALPHABETIZING ROUTINE to simplify proof reading; plus others. AppleWriter is one of the most powerful word processors around, and with AppleWriter Enhancer, it is as full-featured as some of the most exotic packages now being marketed. Specify DOS 3.3 or ProDOS. Send $34.95 to: MIC, Route 1, Box 235-A, Kent, CT 06757.

APPLE II BOOKS—Current selections include:

- Apple II BASIC Programs in Minutes $11.95
- Apple II+/IIe Troubleshooting and Repair Guide $18.95
- AppleWorks: Boosting Your Business with Integrated Software $15.95
- AppleWorks: Tips & Techniques $17.95
- Assembly Lines: The Book $18.95
- Expanding and Maintaining your Apple PC $15.95
- Inside the Apple II (e or c versions) $17.95
- Personal Money Management w/AppleWorks $17.95
- The Apple II Basic Handbook $13.95
- The Best of Educational Software for Apple II Computers $15.95

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WANTED—Names and addresses of new and existing databases as well as information on money-making opportunities using my modem. William Cook, Box 55, Palos Verdes, CA 90274.

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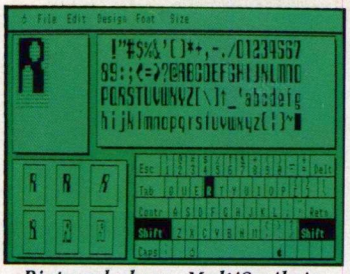

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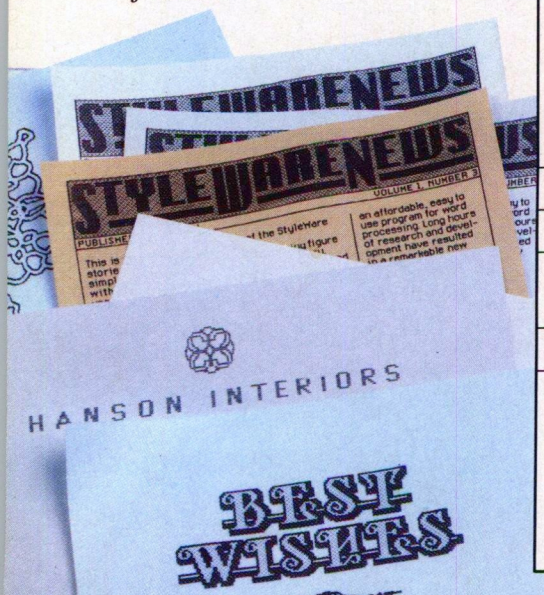

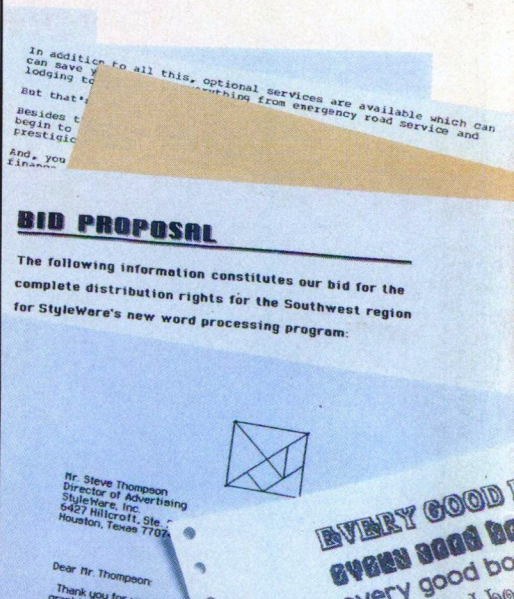
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